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The "New Hungarian Art Music" of Béla Bartók and its relation

to certain Fibonacci Series and Golden Section structures.

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# The "New Hungarian Art Music" of Béla Bartók and its relation to certain Fibonacci Series and Golden Section structures.

**by**

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**Treatise**

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## Dedication

This paper must be dedicated to the man who made it possible. Jess Walters was a great spirit in addition to his operatic and teaching accomplishments. The University of Texas and music in the United States owes him a deep outpouring of gratitude. His students have been serving the universities of Texas and other states for many years. His impact was profound on young people like myself who heard him and worked with him. I could only wish he had lived to see this day.

## Acknowledgements

Elliott Antokoletz has guided me through this process and shown the way. My family has persevered during this long gestational process until this dissertation could be produced. I thank him and them for not giving up on me and keeping the faith when times were difficult. I pray that this offering will make them proud of having been a part of this process. We have all changed much during this time. Thank God for the strength and fortitude of my wife and daughter, who have had to demonstrate great strength to allow this to occur. Only He can truly understand the sacrifices they have made.

The "New Hungarian Art Music" of Béla Bartók and its relation to certain Fibonacci Series and Golden Section structures.

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Béla Bartók (1881-1945), a Hungarian composer and pianist, began his folk song investigations in 1905-6, which were to change the course of his compositional development. The results of these journeys are seen in his early folk song settings: for instance the Eight *Hungarian Folk Songs* (1907-1917) and *Bluebeard's Castle* (1911). These works, among others, are part of this study.

The first chapter discusses the *Bagatelles* (1908) and many folk song settings. The chapter looks at the formal proportions determined by the Golden Section and Fibonacci Series. Chapter two discusses the contrapuntal procedures that were influenced by these proportions. Next a long discussion of the use of various pitch collections and devices in the compositions tries to determine the relation between Golden Section proportions and z-cells, x-cells and other pitch collections in the *20 Hungarian Folk Songs* (1929), *Eight Hungarian Folk Songs* (1907-1917) and *Music for*

*String Instrument, Percussion and Celeste* (1936). The opera is the focus of the next chapter with the proportions of Golden Section and the many related numerical values of the Fibonacci Series. The last chapter discusses the "new chromaticism" of the "New Hungarian Art Music" and the unique relationship of the opera *Bluebeard's Cas*tle and the *Cantata Profane* (1930).

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## Introduction

Béla Bartók (1881-1945), a Hungarian composer and pianist, began his folk song investigations in 1905-6, which were to change the course of his compositional development. The results of these journeys are seen in his early folk song settings: for instance the *Eight Hungarian Folk Songs* (1907-1917) and *Bluebeard's Castle* (1911). These works, among others, are part of this study.

It was Bartók's stated intent to create a "new chromaticism.[1]" This modal or polymodal chromaticism as well as the pure chromaticism, Bartók distinguishes this concept of pure nonfunctional chromaticism -- x-cells for example, are chromatic tetrachords (four notes a half step apart) which cannot be found in traditional scale constructions -- from chromaticism resulting from combining diatonic modes. The latter is a significant characteristic of the "new Hungarian art music." What is this "new chromaticism?" This paper will attempt to answer this question and to assert at the outset that pure chromaticism belongs as much to the tonal as well as atonal spheres. Relevant to this assertion is Bartók's statement that follows. "Real or 'perfect' atonality does not exist, even in Schoenberg's works, because of that unchangeable physical law concerning the interrelation of harmonics and, in turn, the relation of the harmonics to their fundamental tone."[2] Bartók further points out certain characteristics or principles associated with his invention of the "new chromaticism:"

> My first "chromatic" melody I invented in 1923; I used it as the first theme of my Dance Suite. . . . This kind of melodic invention was only an incidental digression on my part and had no special consequences. My second attempt was made in 1926; on that occasion I did not try to imitate anything known from folk

[1] Béla Bartók: *Essays* ed. by Benjamin Suchoff. (New York: St. Martin's Press, 1976), 376.
[2] ibid 375.

> music. I cannot remember having met this kind of melodic chromaticism deliberately developed to such a degree in any other contemporary music.
>
> As to the general characteristics, exactly the same can be said about my melodies as what I said already concerning the chromatic folk melodies. That is, the single tones of these melodies are independent tones having no interrelation between each other. There is in each specimen, however, a decidedly fixed fundamental tone to which the other tones resolve in the end. The main difference between the chromatic folk melodies and my own chromatic melodies is to be found in their range. The former consist exclusively of five, six, or at most seven half-tones, which corresponds to a range of about a fourth. My own melodies generally have at least eight half-tones and cover, in some cases, the distance of an octave or more.
>
> The working with these chromatic degrees gave me another idea which led to the use of a new device. This consists of the change of the chromatic degrees into diatonic degrees. In other words, the succession of chromatic degrees is extended by leveling them over a diatonic terrain.[3]

The intention of this treatise is to show how these two concepts of chromaticism – polymodal chromaticism and real chromaticism - are related to the large-scale structure and design. With regard to the structure, the proportional relations of the so-called Golden Section (or Golden Mean) and Fibonacci Series to the form and content, and this connection with Bartók's stated chromatic concepts, is the primary focus of this study. All of the concepts, e.g. polymodal chromaticism, are assigned by Bartók to be based on a common tone. He clarifies his stand on this as follows.

> By the way, much mischief was done in the worship of polytonality or bitonality. Some composers invented a hackneyed-sounding diatonic melody in, let us say, C, and added a very hackneyed accompaniment in F#. It sounded queer, and the misled public said, "Oh, this is a very interesting, very modern and daring music." Such artificial procedures have no value at all. Incidentally, much of Stravinsky's music, and also of my music, looks as if it is bitonal or polytonal. Therefore, the pioneers of polytonality used to regard Stravinsky as one of their fellow polytonalists. Stravinsky however, deliberately denies this circumstance, even in such exterior features as orthography.[4]

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[3] Béla Bartók: *Essays* ed. by Benjamin Suchoff. (New York: St. Martin's Press, 1976), 379-381.
[4] Ibid, 366-367.

Bartók in his lectures describes the "new chromaticism" and suggests the works that contain examples of these techniques. The examples that the composer suggested for his lectures will help to demonstrate that this "new chromaticism" was used extensively in his works. The composer goes on to say that it is the basis of the "new Hungarian art music."

This is a new and original growth on the original stock of the nineteenth century. While in appearance, the new has features of the old, the basis is very different. It is therefore a radical new procedure that represents a schism from the past. The elements of folk music are the basis of these new procedures and their elements are continually present. There are gross and subtle differences that allow a blending of the old with the new. This occurs already in certain early folk song settings of the composer and soon appears in his more original piano compositions in the years prior to WWI.

When the "new chromaticism" happens in newly composed material after 1926, the results are based on more abstract procedures. In such cases we find the use of cell structures more apparent and begin to find the procedures that have come to be associated with the more forward-looking works of Bartók. The uses and procedures of the "new chromaticism," both polymodal and pure, are many and varied. The value of any system is in its flexibility. The more flexible it is, the more possibilities for its use exist. Bartók's varied types of chromaticism permit a greater number of possibilities. He is the master of the multiple layers and relationships, as will be seen for instance, in the discussion of the *Fourth String Quartet*.

**The Fibonacci Series**

Apparently, Bartók's notions of chromaticism have some important connection with his structural designs. In many works forms expand (or contract) in correspondence with interval structures, i.e. his idea of "diatonic extension" of chromatic themes, or the reverse, chromatic "compression" of diatonic themes. We will see how he observes Golden Section proportions while at the same time stating that the formal scheme is a sonata-allegro. He only tells us that he is observing "the proportions of nature." In the same fashion he can show us the relation of his chromatic concepts and the circle of fifths, the Fibonacci Series, the Folk Modes and the polymodal content. In terms of proportional form, both the Golden Section and the Fibonacci Series are a reflection of the law of natural growth. The Fibonacci Series is the number of new branches if each splits each year: 2, 3, 5, 8, 13, 21, 34, etc. These come to reflect the .618 proportion of the Golden Section[5].

> Golden Section has another unique property: any summation number series with a 'memory' of two terms – that is, in which each term is the sum of the preceding two terms – gradually approaches, as its values increase, a geometric series with a Golden Section ratio. The basic series of this type begins with 0 and 1, giving 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144 . . .; this is known as the 'Fibonacci' series and represents – from 1, 2 upwards – nearest whole-number accuracy to Golden Section. For example, 34 x 0.618034 = 21.013 . . .; 34/ 0.618034 = 55.013 . . . The next possible series known as the Lucas sequence, begins 1, 3, giving 1, 3, 4, 7, 11, 18, 29, 47, 76 . . ., and yields nearest whole numbers to Golden Section from 4, 7 upwards. This whole-number way of representing Golden Section is obviously important if the ratio is to work in musical forms where divisions normally have to conform also to whole numbers of bars, beats, semitones and so on.[1]

[5] Ernő Lendvai, Béla Bartók: an Analysis of his Music (London: Kahn and Averill, 1971), 27-29.

The original problem that the Fibonacci sequence described is the reproduction of rabbits. This celebrated problem appears in the Liber abaci, published in 1202 by the Italian merchant and mathematician Leonardo di Pisa, or Fibonacci. He was referred to as Figlio dei Bonacci (Son of the Bonaccis).

> A pair of newly born rabbits, male and female, were placed in a hutch. In two months these rabbits began their breeding cycle and produced one pair of rabbits, one male and one female. The original rabbits and their offspring continued to breed in this manner, that is, the first pair of offspring appearing at the parental age of two months and then a new pair every month thereafter – always one male and one female. All rabbits survived the first year.
>
> What then is the total number of pairs of rabbits at the beginning of each month during the first year?[6]

The original pair had their first pair of offspring at the third month, another at the fourth month. Two pairs were fertile at the beginning of the fourth month, resulting in 2 pairs of offspring at the beginning of the fifth month, and so on:

| MONTH: | PAIRS OF RABBITS: | | |
|---|---|---|---|
| Beginning of : | Productive | Nonproductive | Total |
| 1st | 0 | 1 | 1 |
| 2nd | 1 | 0 | 1 |
| 3rd | 1 | 1 | 2 |
| 4th | 2 | 1 | 3 |
| 5th | 3 | 2 | 5 |
| 6th | 5 | 3 | 8 |
| 7th | 8 | 5 | 13 |
| 8th | 13 | 8 | 21 |
| 9th | 21 | 13 | 34 |
| 10th | 34 | 21 | 55 |
| 11th | 55 | 34 | 89 |
| 12th | 89 | 55 | 144 |

[6] Jan Gullberg, *Mathematics: From the Birth of Numbers* (W.W.Norton: New York, 1997), 286-288.

The resulting sequence looks like –

1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377, .....

this reveals that each successive term is the sum of the two immediately preceding terms: that is, Fibonacci numbers satisfy the recursion formula:

$F_n + F_{n+1} = F_{n+2}$

$F_1 = 1;\ F_2 = 1$

The Fibonacci Series is therefore a series of whole numbers, except when splitting hares.

**The Lucas Sequence.**

There is no evidence that Fibonacci further explored the sequence. His name became attached to it in a paper by the French mathematician Edouard Lucas.[7] In 1753, Robert Simson of the University of Glasgow showed that the ratio of one Fibonacci number to the one preceding it,

1/1, 2/1, 3/2, 5/3, 8/5, 13/8, . . . .

draws progressively nearer, alternately from above and from below to the Golden Section.

Golden Section = 1.618 03.

The Lucas Sequence has been said by some to be a whole number version of the Fibonacci Series. According to Jan Gullberg, this is not correct. The Lucas Sequence is a method of discovering prime numbers and is unrelated. It is the solution of another recursion formula.

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[7]Jan Gullberg, *Mathematics: From the Birth of Numbers* (W.W. Norton: New York, 1997), 286-288.

This discussion is a subject that is worthy of study on its own. Interested students are directed to the Journal of the Fibonacci Society. We should be content with the understanding that these principles are tightly wound together in the study of geometry and geometrical progressions that have come down to us through the earliest writings on mathematics. The ancient Greeks and Arab or Moorish scholars are earliest sources we are aware of, but monuments of the ancient world including the pyramids of Egypt and the Parthenon have been shown by many scholars to have been designed incorporating the Golden Section principle. Leonardo Fibonacci of Pisa was a student of Moorish scholarship.

We have no way of discovering what study brought Belá Bartók to his understanding of the Golden Section. It is understood that he felt that he was observing the "proportions of nature". He discussed this in his lectures at Harvard University. He thought it remarkable that several different forms of art were observing these proportions at the same time. From his earliest published works, we will find that he used Golden Section as an organizing force in the formal proportions of his works. Bartók also may have discovered a method of deriving a scale from the Golden Section, in much the same way that the Greeks created our modern musical system of pitch organization.

These relationships are carefully worked out and shown in the various works we will examine. There are layers and ingenious relationships that would have been the delight of a mediaeval theoretician. The composer always protested that he composed by instinct. He claims in the lectures that he only realized many of the things he was doing after the fact when he looked back at what he had written. We will discuss the Harvard Lectures in which he attempted to explain to other musicians what he was doing earlier by attempting to bring what he had learned in his folk music research to a wider audience through his "new Hungarian art music".

We will also examine the more sophisticated uses in the later works. These include the *Fourth String Quartet* and the great *Cantata Profana*. From the early folk songs and the opera, the composer went on to use more complicated and difficult procedures in the *Twenty Hungarian Songs* of 1929. At about the same time, contrapuntal procedures occurred in important roles in the *Fourth String Quartet* and *Cantata Profana*.

Unlike 18th century counterpoint, Bartók uses countrapuntal procedures as defining points in the form. Fugues and Canon were not normally part of the structure in the time of Johann Sebastian Bach, the famous contrapuntalist. J. S. Bach would have been delighted with Bartók's inventive use of fugal procedures. This will be an important part of the discussions of the *Fourth String Quartet* and *Cantata Profana*.

# Chapter One

## Formal Proportions in

## *Fourteen Bagatelles(1908)* and

## *Twenty Hungarian Folk Songs(1929)*

To state a truism, the beginning is the natural place to begin a search. We are looking for the roots of the source of Golden Section in the works of Belá Bartók. Among his earliest published compositions were settings of the Hungarian folk songs that were collected by the composer in a number of expeditions, for instance, the 20 *Hungarian Folk Songs* set in 1906 by Bartók and Kodály. Among the early masterpieces were the *Fourteen Bagatelles*, Op. 6 (1908).

> Among these early works, the Fourteen Bagatelles for Piano, Op. 6 (1908) had juxtaposed, transformed and to some extent synthesized many of the elements that were to be basic to his musical language throughout his compositional evolution. The fusion of all these elements in his mature works was to result in a highly complex and systematic network of divergent chords and scales. Bartók's comments regarding the means by which he derived his harmonies from modal folk melodies suggest a link between the folk-music sources and certain procedures associated with serial composition[Belá Bartók's Essays, ed. Benjamin Suchoff (New York: St. Martin's Press, 1976), p. 335] (The term series denotes a succession of elements, such as the Schoenbergian twelve-tone set, that have a fixed order. Although Bartók's music is based on unordered non-twelve-tone sets, that is, those that have fixed intervallic content but not ordering, the means by which he establishes connections between the melodic and harmonic levels are closely related to those found in serial compostions.)[ George Perle, Serial Composition and Atonality (5th ed., rev., Berkeley and Los Angeles: University of California Press, 1981), p. 40] Bartók described his transformation of folk elements into unordered abstract pitch sets as follows: "Through inversion, and by placing these [modal] chords in juxtaposition one above the other, many different chords are obtained and with them the freest melodic and harmonic treatment of the twelve tones of our present day harmonic system . . . Of

course, many other (foreign) composers, who do not lean upon folk music, have met with similar results at about the same time – only in an intuitive or speculative way, which, evidently, is a procedure equally justifiable. The difference is that we created through Nature."[8]

**Creation through Nature.**

This "creation through Nature" is a significant issue, and fundamental to Bartók's stated interests. The Bartók scholar, Elliott Antokoletz, in his commentary above, asserts that Bartók's sets are unordered. His contention is that Bartók used the twelve tones equally without a consistent serial organizing factor. In other words, the content of sets is fixed but without a consistent order of their elements. As seen in the quotes from the essays above, Bartók states that foreign composers arrived at "similar results at about the same time—only in an intuitive or speculative way." On the other hand, Bartók says that he "created through Nature" How Bartók organized the melodies will be addressed later in the paper, but first let us explore the natural phenomenon in Bartók's proportions.

All of the proportions of nature have relevance to the folk sources. In the next sentence after the quote above, Bartók states that "the peasant's art is a phenomenon of Nature." It is therefore no suprise that the proportions of Nature would occur in a folk song. When making simple settings for folk songs, the usual simple song forms would naturally be used. Versification of the songs naturally leads to a two-part form for two verse songs as the music follows the text. Three-part forms are frequently seen as being quite natural as well. Our Western art music minds would be surprised to find that a simple two-part form can be supplanted by the Golden Section proportion. It is surprising that this would be unexpected. Simple songs can be shaped into a variety of

[8] Elliott Antokoletz, The Music of Belá Bartók (Berkeley and Los Angeles: University of California Press, 1984), p. 1.

proportions. The Golden Section is one of the most beautiful and natural proportions in nature.

**Golden Section in small forms.**

Bartók uses many forms in his compositions and many songs are through-composed. In the shorter forms where complicated formal devices would not be appropriate, Bartók uses many types of formal patterns. Frequently they are overlaid. The Golden Section proportions can be used in combination with other forms as we will see later.

Let us examine some short, simple piano pieces that were among Bartók's earliest published works. The Fourteen Bagatelles Op.6, for piano, composed in 1908 (published in 1909 by Rozsuyai) remain a popular part of the piano repertoire. The first example is the second Bagatelle. It is 30 measures long and has two returns of the original rhythmic and harmonic theme. The opening measure has repeated eighth notes a major second apart. This pattern repeats over the course of 6 measures. A melody joins the repeated notes in measure three. (Figure 1)

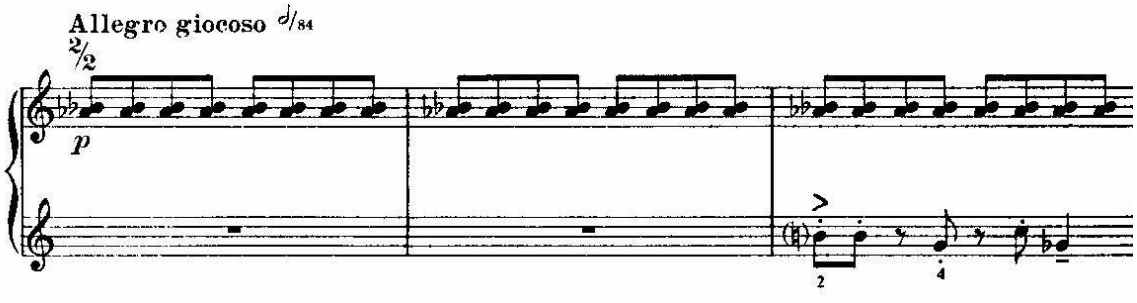


Figure 1: *Fourteen Bagatelles*, 2

This is of course one of the Fibonacci sequence numbers. It might be noted that the melody continues the Fibonacci Series with 5 measures before a cadential figure

occurs that introduces new material. Together 3 and 5 form the first 8 measures that end in a cadential type of figure. This introduces new material that leads to the return of the original eight note pattern before new material occurs at 13, our next number in the Fibonacci Series. One could say that this is a two-part form, the second section beginning at measure 13 – approximately half way through the short piece. The equal two-part form is less visible than the Fibonacci formal division. The new material at 13 only continues for 5 measures until 18 where our original motive returns. The argument could be made that it is in two parts. However, there are two returns of the original material, causing a feeling of a three-part rather than two-part form. After each statement there are approximately 5 measures of differing material. This gives us a feeling there are three symmetrical (Golden Section) sections.

Multiplying by our .618 proportion we look to measure 18. We find that at that point we have an almost exact repetition of the first measure. It is transposed, using D and E, instead of Ab and Bb. It still can be recognized as the original theme. (Figure 2)

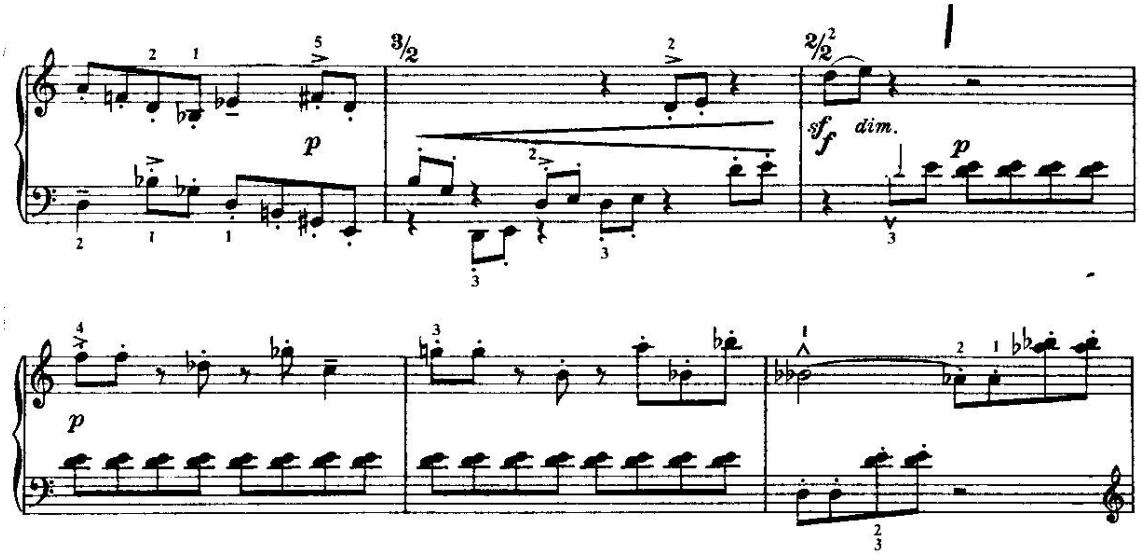


Figure 2: *Fourteen Bagatelles*, 2 mm 16-21

Also note that a variation of the original theme occurs at the negative (.382) Golden Section point of measure 11-12. The negative Golden Section is the complement of the positive. Multiply by .382 instead of .618. These two proportions form the whole. It can also be found by subtracting the positive Golden Section from the measure count of the whole.

Notice that the measure count for the whole was extended by one measure. This helps make our Golden Section proportion more noticeable. Bartók could have easily put a fermata over the last note and left off the other measure. It would have in no way changed the length in performance. This is entirely a method of changing the measure count. (Figure 3)

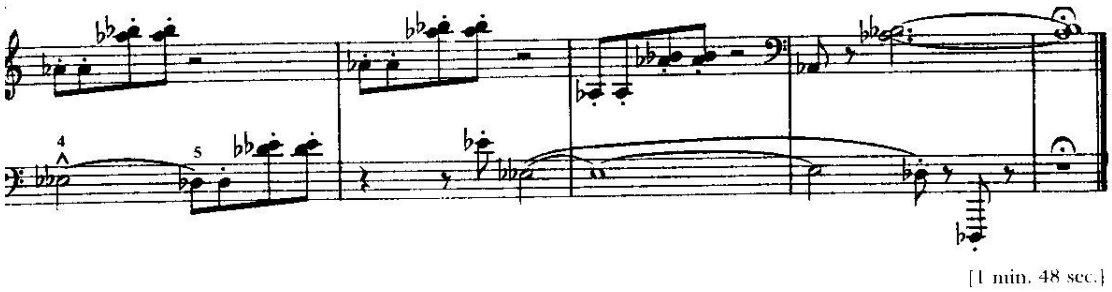


Figure 3: *Fourteen Bagatelles* 2 mm 26-30

Next we will examine a piece from the same collection that uses this device in some interesting ways. Without this observation of how he manipulated the measure count, it might make the arguments in the next discussion seem implausible. The next piece uses several time related notation devices to manipulate the measure numbers. This study will make some things later in the paper seem more natural. In the next piece we examine how Bartók uses notational devices to adjust the way that the measures fall in

the Golden Section proportions. This is similar to the device used in the *Fourth String Quartet* that I discuss later in the paper.

**Notation, Notation, Notation.**

Bagatelle 9 is a larger more complicated piece. In this case the composer has in fact changed the number of measures of the piece. The overall length of the piece has changed by using double whole notes in the last measure. Technically these should have counted as two measures each. Bartók puts four of them in one measure. In effect he has lengthened the piece by at least 4 measures. (Figure 4) He did much more as will be shown below.

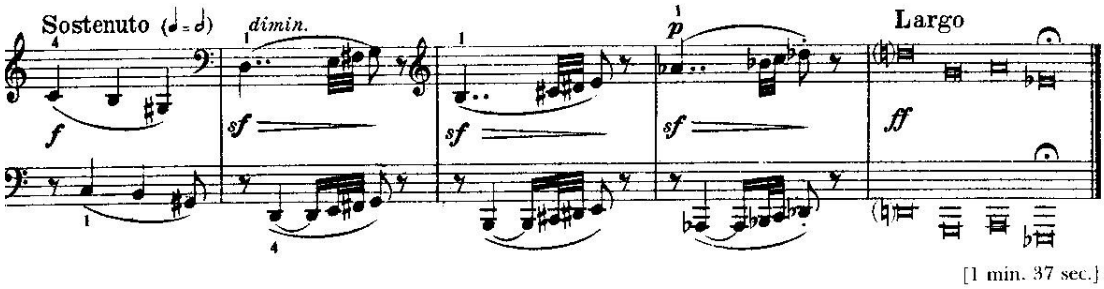


Figure 4: *Fourteen Bagatelles*, 9 mm 65-69

Let's look at the piece now. The main subject begins at measure one. The first four measures form an identifiable theme that we see repeated two more times. A cadential figure marked Molto sostenuto occurs in measure 14. By definition, firmatas add twice the value to a note. It is as if measure 15, Tempo I is actually measure 16. The negative Golden Section should be expected at measure 26 – 27. A cadential figure occurs at measure 27 – 28. This leads to a development of measures 9 – 11 in the main theme section. Then, a repetition of the cadential figure from Theme I occurs. Molto sostenuto is the marking for measure 37-38. Another fermata closes the section. If we

add another measure for this fermata and the previous one, the next measure would be 41. This would explain a reiteration of the Theme I at measure 39 instead of 41 – 42 (Figure 5).

One could argue that the Golden Section is not the form. Or one could say that the form is off by 3 measures. One might even be tempted to go as far as saying that the entire piece is off by 10 measures and doesn't fit the Golden Section pattern at all. That person could be right. But, if she is, why did he change the overall length with the double half notes at the end? Is it temporal? Does the Molto Sostenuto and then Tempo I at the end of sections mirror the Sostenuto and double half notes at the end? This is difficult to say. The composer gave us indications that the length of the notes was important. Notice the note in parenthesis above measure 38. A quarter note is equal to a half note tied to an eighth. Why so precise? There would be almost exactly three times as many beats in that measure if that is followed. Also the tempo marking is above the previous measure. If each note is equal to a measure (slightly shortened) then there are six measures in those two in the score. The other point is measure 13 and 14 of the score. It is also marked Molto Sostenuto and the instruction is one quarter equals a half. That would change the two measures into 12 beats, or four measures. If we add four measures and four measures and then take the four double whole notes at the end as two measures each, we add 8 measures to the length of the piece. Then he also marked measure 65 to the end as Sostenuto – one quarter equals a half note. Four measures would then be equal to twice as many, or eight. This would lead to a grand total of 16 more measures (plus six eighth notes – remember the notation in measure 38). So we are left with the grand total of 17 measures. What happens to the Golden Section? 69 plus 17 equals 86. The Golden Section of 86 is 53.148. Is that meaningful? There is nothing significant at 53 or the corrected number of 53 – 8 = 45. Wait! Those extra 17 were

from the end of the piece. As the point the Golden Section would occur is still only showing the lengthening by the earlier eight. If one adds 69 and 9 to result in 78, what is the Golden Section? The Golden Section of 77 is 48.204. At measure 39 plus 9 equals 48. There you find the second fermata and the return of the Tempo I. That would be the precise spot that one would expect for the Golden Section to occur. This is a type of puzzle where the pieces have been mixed and matched in ingenious ways, as J. S. Bach did in his Goldberg variations. It also helps to anticipate the use of Golden Section in the Fourth String Quartet that is discussed in the next chapter.

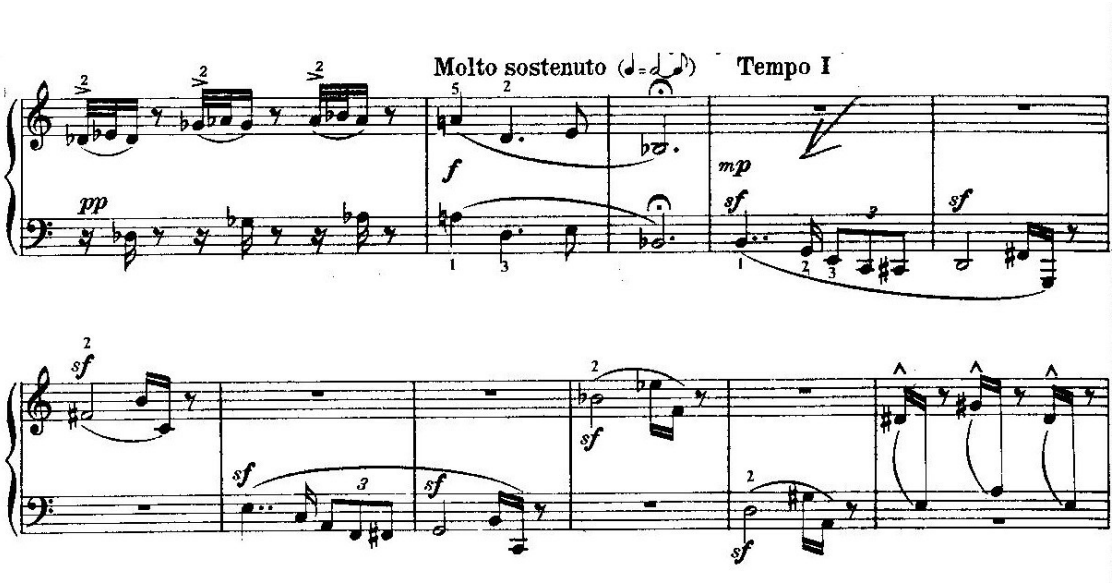


Figure 5: *Fourteen Bagatelles*, 9 mm. 36-46

**FOLK SONG SETTINGS.**

The next example is a set of songs that are among Bartók's latest published songs collections. In the nineteenth century many famous composers published numerous settings of folk songs. They were an inportant source of income that reached into the

homes of amateur musicians in ways that the larger works could not. The amateur pianist with a piano in his home meant that composers could publish for the emerging middle class in contrast to Wolfgang Amadeus Mozart's and Franz Josef Haydn's life and work centered around the aristocracy. With Haydn's student, Ludwig van Beethoven, the composers started to turn their attention increasingly to the larger musical audience of the new middle class and increasingly well-educated amateur. Bartók is at the end of a long process of musical life transformation. He put great care and effort into all of his works as we have seen. These publications are a result of his folk song collection journeys with Zoltán Kődaly. They are also a result of his determination to return to his Hungarian roots.

The *Twenty Hungarian Folksongs* were divided into 4 collections. The first set are all organized by Golden Section. The last set of the 4 is a set of 5 songs that are made into one continuous piece, the Song of the Young Man (or boy). One leads directly into the next. And so they can be considered as one large piece. We saw in the previous pieces how Bartók uses the Golden Section and Fibonacci Series in individual pieces. What about longer more involved pieces? Larger pieces are like song cycles, they grow from a group of smaller pieces being joined.

The pieces of this set will be seen as observing the Golden Section in their overall shape while each individual song is rooted in the Fibonacci Series. Since the Fibonacci Series is an expression of the Golden Section, that means that the songs also exhibit Golden Section proportions. Each song will be found to conform to a Fibonacci number. Songs 2 and 4 each are 11 measures of vocal part before the cadence and tempo change in measure 13. The first song is 21 measures with the cadence and tempo change in the 22nd measure. The third song is 35 measures in length (or 33 measures from the start of the vocal line). The fifth and final song is one measure too long(56), but it combines

with the 89 measures of the previous four songs to give the total of 144 the next two Fibonacci numbers. Again, the last song is 54 measures from the beginning of the vocal line to the end of the song. There is consistency here in the way each song's vocal melodies are one less than the Fibonacci number allowing for a cadence and tempo change on the actual Fibonacci number.

The fifth song actually being one measure too long for the Golden Section point creates a similarity with the *Fourth String Quartet*. The fifth movement of the quartet is 392 bars in length. The overall measure count is 998. 998 * .618 = 616.764. 998 – 392 = 606. The Golden Section of the Fourth String Quartet occurs at measure 616 (rounded to 617). That means that the Quartet is off by the exact same proportion as the set of songs. 10 / 998 = .01. 1 / 144 = .01 (rounded from .069). The introduction of each ends at the exact point where the Golden Section occurs. The quartet sees the beginning of the Arabian rhythm and the song sees the beginning of the vocal line.

The first piece in this group (Figure 6) has many Golden Section characteristics. Bartók uses the combinations of the Fibonacci numbers as they are derived from the Golden Section proportions. 2 + 3 = 5, 5 + 3 = 8, 8 + 5 = 13, etc. First is two measures of accompaniment, then the voice joins for 3 measures to add up to 5. A similar motivic device of 3 measures adds to the first 5 to bring us to 8. Look at Figure 6 for a moment and this can be easily seen as this pattern begins to develop.

Deutsche Übersetzung von R. St. Hoffmann

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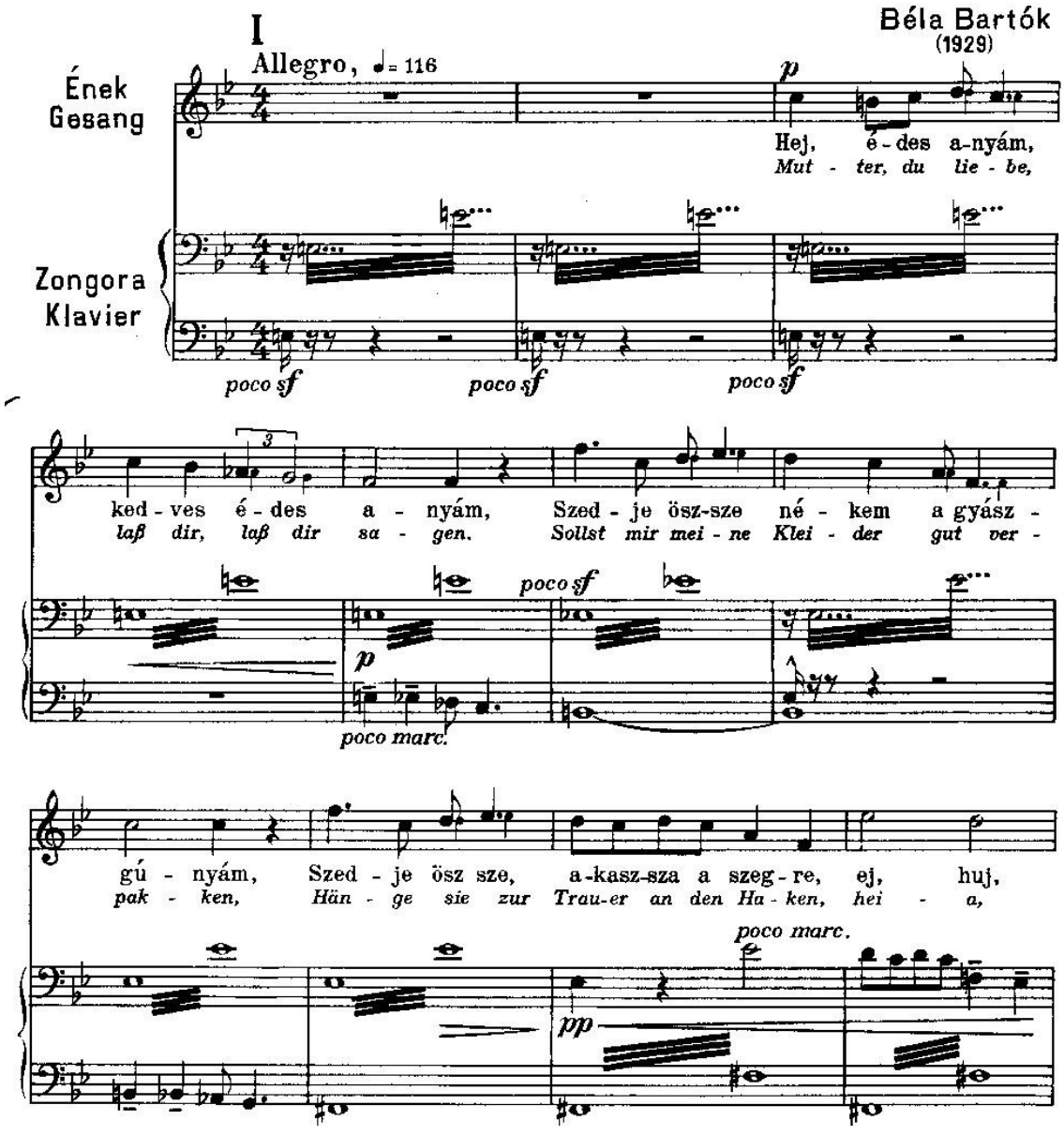


Figure 6: *Twenty Hungarian Folk Songs,* IV, 16 mm 1-11

Then starts the repetition of the pattern that dominates the rest of the song. The first two vocal motives of three measures each are related to the motive that makes up the remainder of the melodic material for the voice. This is made up of two 6 measure phrases. (Figure 6)

Look back to measure 5 in the accompaniment. There is a cadential figure of downward movement in the bass line that leads to a tonal shift. Notice this occurs again in measure 8, at a different pitch level. Then it should come as no surprise that this occurs again at measure 13. The next Fibonacci Series number is at the final cadence, measure 21 – 24, that lead to the second song at 25. One could argue that these are just coincidences. There is a certain number of coincidences that become absurd. This is surely past the point of insisting that these are not done with forethought.

| | | | | |
|---|---|---|---|---|
| 1 | 21 | 34 | 55 | 89-144 |
| 1st song | 2nd song | 3rd song | 4th song | 5th song |

The next Fibonacci point is 34. It is very like the events at 21. It is a cadential point of the second song. So the entire second song, only thirteen measures long, occurs between the second and third Fibonacci points of measures 21 and 34. The next song contains the next Fibonacci number 55. This is an important point in the text. "My dearest love, goodbye!" must have represented to Bartók the focal point of the group of songs. To emphasize the importance of this point in the song, the composer inserts the longest piano interlude of the cycle, and changes tempo and key. The four measures that follow punctuate the extended repetition of these important lines (including the 4 measures of piano interlude). This is the same way that the Golden Section points are

handled in the opera Bluebeard's Castle. We will continue to find other similarities in their treatment, melodic material and pitch content.

This important treatment of the overall Fibonacci number should not distract us from the fact that the fourth song itself is 35 measures. This gives us the strong final cadence figure at 34. The cadential emphasis is emphatic on the final measure of 35. This shows the Fibonacci pattern through the definite ending of the section at measure 34.

The fourth song is very similar in many ways to the second song. It has regular 4 measure phrases using similar pitch collections. Like the second, it is short. It should be noted, however, that both songs have their final cadence figures on measure 13. You might at this point be thinking that too much is being made of these seeming coincidences. The last song in the group will either prove it or make you feel that these are just good proportions that come from the natural style and grace of an eminent composer. The last straw could be that the last song starts at measure 89, a Fibonacci number. It is exactly 56 measures long, another Fibonacci number (with the cadential extention). This give us a final measure count for the 5 song collection of 144. Theoretically, the Fibonacci numbers continue, but most series stop there.

If one is acquainted with Bartók's music, then one finds this kind of playfulness is expressed in many ways. There is also the necessity to make things work out correctly in aesthetic as well as mathematical terms. Why would a young composer go to such lengths to make things work out properly in a short simple piano piece? We have to come to a realization that he is working at a very sophisticated level. Whenever we see a simple piece, for example, the 3rd movement of the *Fourth String Quartet*, we must know that even in the most simple piece there can be underlying levels of sophistication.

**Conclusion.**

In this opening chapter we have examined folk song settings and piano works. The formal organizations of small pieces have been shown to be derived from Golden Section. These can be combined to form larger works: songs into cycles. The crafty composer uses interesting manipulations of time and measure count to bring these into being. At the most simple and most complex levels Bartók uses Golden Section as a unifying and formal device. The basic building blocks of form have been shown to be built from motives that conform to the Fibonacci numbers. These are combined to produce songs. The songs are in turn organized through the Fibonacci Series numbers and the Golden Section. The complexity of the wonderful *Fourth String Quartet* demonstrates this in the next chapter.

# Chapter Two

# Golden Section

# And contrapuntal procedures

# In Bartók's *Fourth*

# *String Quartet* (1928).

## INTRODUCTION

Along with many composers of the early part of the twentieth century, Bartók was able to use new and more complex rhythms as an organizing structural factor of his music. This potential was permitted by the new scientific research in folk music, in which the formal and nonfunctional modal structures were no longer tied to the regular barline. Changes of meter implied expanding and contracting motive groupings of pulses. The implication was significant for Bartók's formal conception of expanding/contracting proportions that manifested themselves in the Golden Section and Fibonacci concepts. In his essays,[9] Bartók spoke of "stages of evolution" in the rhythmic patterns of the music he transcribed from folk music. In the fourth quartet, this early experience in the manipulation of folk music would lead to a method of rhythmic transformation that would become part of his means of formal structural organization.

[9] Judit Frigyesi, "Between Rubato and Rigid Rhythm: A Particular Type of Rhythmical Asymmetry as Reflected in Bartók s Writings on Folk Music," Studia Musicologica, 24 (1982): 332.

This occurs through the return of the most significant rhythms and figures at important structural points.

> Halsey Stevens has said of Bartók's fourth Quartet: ". . . a thorough analysis of the polyphonic methods in the work would be a Herculean task; but almost every note could be accounted for". This is not only true of almost all the music of the quartets, but of most of Bartók's work.[10]

In the area of formal proportions, which Lendvai and others have shown[11], it is well known that Bartók used the Fibonacci (or Lucas series) in conjunction with the Golden Section in his compositions. Although the Golden Section and the Fibonacci Series had been found in Bartók's works, several of the most noted Bartók scholars had been unable to find these in the first and second movement of the *Fourth String Quartet*. These mathematical principles had been found at the highest architectonic levels in the other movements. George Perle examined the Golden Section and Fibonacci Series in the Fifth Quartet of Bartók.

> The Hungarian theorist Lendvai has shown that the *Music for String Instruments, Percussion, and Celesta* and the *Sonata for Two Pianos and Percussion* (1937), as well as other Bartók works of this period, employ the Golden Section as a determinant of formal proportions. The first, second and fourth movements of the Fifth Quartet offer further evidence. The first movement consists of 218 measures, which divide in Golden Section into approximately 134.7 and 83.3. There is no question that these dimensions are exploited in the movement.[12]

Bartók marked the series in the third movement of the *Fourth String Quartet*. The Golden Section has been found to determine the proportions of many of Bartók 's works and is alluded to in his Harvard Lectures. The Fibonacci Series derives from the

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[10] Bernard Rands, "The use of canon in Bartók 's Quartets," Music Review 18/3 (August 1957): 183-188.
[11] Ernő Lendvai, Béla Bartók: an Analysis of his Music (London: Kahn and Averill, 1971), 17-66.
[12] Béla Bartók, Fifth String Quartet, Tatrai String Quartet with notes on the quartets by George Perle (New York: Dover, 1968), 7.

Golden Section with its two-thirds proportions of .618. This is found in nature in the Conch shell and similar natural formations. Each section is .618 of the next one.

This paper will show the way in which Bartók incorporated both the Fibonacci Series and the Golden Section in the first movement based on a quatrain structure. This was based not on the main theme, etc. but instead on the repetition of the stretti inside the quatrain structure.

The quatrain is the traditional European form for folk songs. When an author is trying to sound simple and rustic he adopts rhymed couplets that form what is usually known as a folk ballad, or song. Here's an example from the first stanza of my poem –

"Firefly Seeds"

I don't recall planting firefly seeds,
But a bumper crop I've raised.
The yard's alight as here the deeds
Of tiny sparks are coolly blazed.

In the poem there are two pairs or rhyming couplets in the pattern abab. The most traditional form for the folk ballad is abab, but aabb and aaab are also common. We hear it today in popular music and the music of those popular singers known as "folk singers". Bartók adopts this scheme in his music as one of the concepts of folk songs. It works along with other folk aspects including the pentatonic and other traditional Hungarian, Rumanian and Slovak scales that are found in Bartók 's music. This stemmed from his collection of folk music. Contemporary symmetrical pitch structures, such as the whole tone scale and others are an outgrowth of the modal constructions of folk music.[13]

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13 The discoveries in this paper are a direct influence of the Dissertation of Elliott Antokoletz: "Principles of pitch organization in Bartók 's Fourth String Quartet" (Ph.D. Dissertation: City

**STRETTI AND GOLDEN SECTION**

Several writers have shown how the Golden Section and the Fibonacci Series have been used to define the highest architectonic levels of division in the movements of the *Fourth Quartet*. Both the Golden Section and the Fibonacci Series are a reflection of the law of natural growth. The Fibonacci Series is the number of new branches if each splits each year: 2, 3, 5, 8, 13, 21, 34, etc. These come to reflect the .618 proportion of the Golden Section[14].

> Golden Section has another unique property: any summation number series with a 'memory' of two terms – that is, in which each term is the sum of the preceding two terms – gradually approaches, as its values increase, a geometric series with a Golden Section ratio. The basic series of this type begins with 0 and 1, giving 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144 . . .; this is known as the 'Fibonacci' series and represents – from 1, 2 upwards – nearest whole-number accuracy to Golden Section. For example, 34 x 0.618034 = 21.013 . . .; 34/ 0.618034 = 55.013 . . . The next possible series known as the Lucas sequence, begins 1, 3, giving 1, 3, 4, 7, 11, 18, 29, 47, 76 . . ., and yields nearest whole numbers to Golden Section from 4, 7 upwards. This whole-number way of representing Golden Section is obviously important if the ratio is to work in musical forms where divisions normally have to conform also to whole numbers of bars, beats, semitones and so on.[15]

This was discussed in the previous chapter. The Lucas Series, is unrelated, while the Fibonacci Series is actually a whole number derivation of the Golden Section. In the next example, Golden Section is seen to be the exact proportion that the whole number Fibonacci Series represents. In addition, there are definite connections between the

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University of New York, 1975). I was attempting to recapture the work that Antokoletz did in developing his cell theories. Antokoletz' advice and assistance made this paper possible and only through his gracious cooperation could this work have been accomplished.

[14] Ernő Lendvai, Béla Bartók: an Analysis of his Music (London: Kahn and Averill, 1971), 27-29.

[15] Roy Howat, Review-Article: " Bartók, Lendvai and the principles of proportional analysis," Music Analysis 2:1 (1983); 69-70.

Golden Section and Fibonacci Series in these movements and the canonic and fugal treatments. In the first movement these connections will be shown.

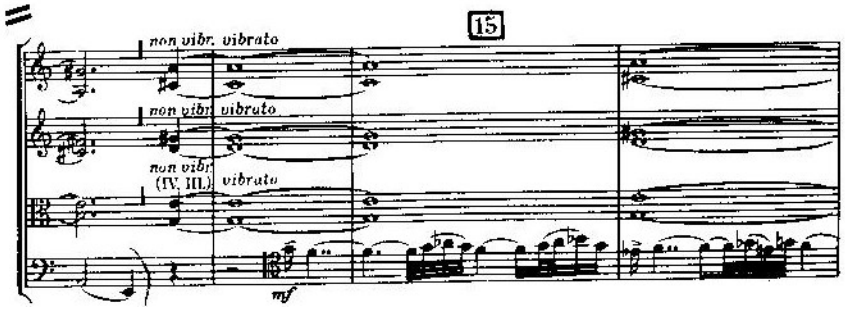


Figure 7: *Fourth String Quartet*, III mm 13-16

In the third movement, the Fibonacci points are easily seen through Bartók's own markings in the score (Figure7). These can represent phrase markings for the string players at the point of the cadence. It should also be noted that in this case Bartók drew marks in the music at the point of the Fibonacci number. The marks occur at the exact

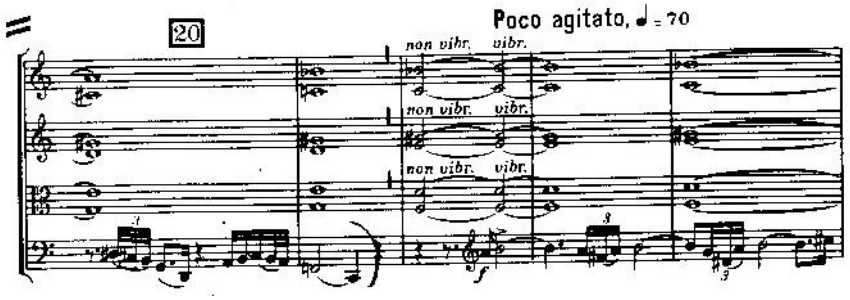


Figure 8: *Fourth String Quartet*, III mm. 20-24

point of the Golden Section (the tick mark inserted by the composer in Figure 8), not the rounded off whole number of the Fibonacci Series. This creates a break in the exact point in time of the Golden Section; this precision will also be observed in the first movement. These points are part of the formal plan as they are in the first movement. The quatrain structure and canonic imitation join with the Fibonacci Series to create a

combined structural organization. In the fifth movement the Golden Section is seen in the major structural divisions.

Gillies found in the *Divertimento* that "Bartók is fascinated with the duplicative possibilities of simple patterns." [16]

> "His process of melodic and rhythmic variation begins in the second bar, firstly with rhythmic compression and then a greater pitch rise towards the middle of the phrase, which eventually leads him to lengthen the phrase to five bars if he is to regain his original concluding note of G smoothly.[16]

Canonic subjects (Figure 9) are evident at prominent G. S. (Golden Section) points, created from the rhythmic motives that form the basis of the structure of the fourth string quartet. Antokoletz states in his dissertation "G. S. proportions do not define the highest architectonic levels of Movements I and II."[17] Reading this made me question why the other movements would be ruled by Golden Section and brought about a re-examination of this issue. If one examines the first movement in terms of the G. S., there are 161 measures. Multiplying by .618 gives the product of 99.498 or in other words the last part should begin on measure 100. Compare measures 1 through 8 of the exposition with measures 92 through 100 of the Recapitulation. In each case there is a statement of the main theme followed by a pattern of three eighth notes at the fifth measure that leads to a stretto in fugal imitation at the eighth measure. The eight measures of the stretto statement should be considered the main theme, so the G.S. point is correct. These fugal imitations mark the important points throughout the quartet. Strettos and canons, instead of what has been considered the main theme, mark the

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[16] Malcolm Gillies, "Final Chamber Works," in The Bartók Companion ed. Malcolm Gillies (London, Faber and Faber, 1994), 331-345.
[17] Elliott Antokoletz, Principles of pitch organization in Bartók s Fourth String Quartet (New York, City University of New York, 1975), 149.

important points. Bartók could be using other criteria for the basic building blocks of his form. However, the use of G.S. or Fibonacci in movements III or V is a logical outcome of Bartók's process of expansion as the work progresses to its culmination. Movements I and II are predominantly semitone contexts, of course, with cells x, y and z expansions, but the overall context maintains the contracted-interval character. Movement III, a whole tone context now permits the direction of expansion, and so, Bartók now brings in the Fibonacci proportions as part of the overall structural and intervallic expansion.

Movement V in G.S. is very similar to what was looked at earlier in the paper.

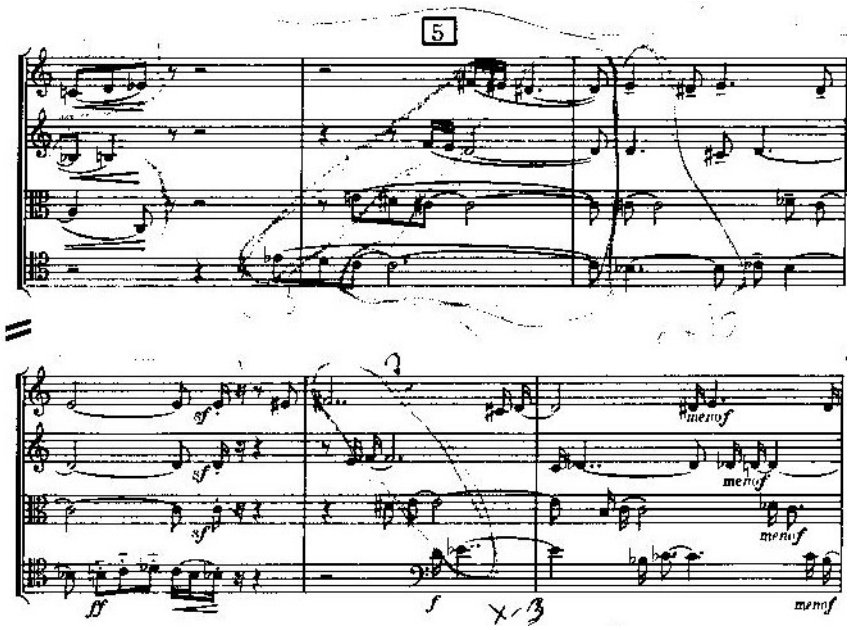


Figure 9: *Fourth String Quartet*, I mm. 4-6

## FIBONACCI SERIES AND THEMATIC MATERIAL

Now look at the exposition: first measure - main theme; third measure - the b part of theme; measure five (Figure 9) - a stretto on second half of main theme; measure eight - a stretto on the first two - note figure of the main theme. The next Fibonacci number is 13. At this point there is an end of the section. Then at m. 14 the new material begins that introduces the canonic imitation in the violins. The viola in 5/8 and cello in 7/8, 8/8, 8/8, 5/8, 7/8 are polymetric using different combinations of eighth note beat patterns. This continues until the new pattern brings the canon and accompaniment into agreement. They phase back into the same rhythmic pulse in m. 22. The series ends at m. 21, as one would expect, leading to a new style of counterpoint at m. 22. This gives a total of eight measures (as in 7/8) between 13 and 21. The z-cell and y cell in m. 21 and then 22 are a type of cadence or resting place that leads to rhythmic completion and the end of the polymeter in m. 22. A z-cell is a microcosmic set of fixed intervallic content. It is two tritones a half step apart.

Again a stretto determines a Fibonacci Series point at m. 34, the same way it occurs at the opening of the movement and at m. 100. The second theme in the French manner begins at m. 30 then ends at m. 34. As there is an introduction of the main theme and then a stretto in mm. 8 and 100, here there are six measures that lead to the stretto between the viola and cello. In each case the sequence of events follows a plan.

**COMPARISON OF GOLDEN SECTIONS, FIBONACCI SERIES AND THEMES**

| **Theme** | **Stretto** | **Stretto** | **Canon** |
|---|---|---|---|
| 1(Main) | 5 | 8 | 14 |
| {16 | 21 | 26 | 30} |
| 30(2nd) | 35 | 38 | 44(Closing Theme Double Canon) |
| 50(Dev) | 55 | 58 | [61](Main Theme) |
| 92(Recap) | 96 | [101] | 105 |

Fibonacci = underscored  Golden Section = [ ]

Included in chart: Main theme, transition (14), 2nd theme (30), Closing theme (44), Development (50), Recapitulation Main theme (92), transition (105).

Main Golden Section points: 1, 60 – 61, 99 - 100.

The missing Fibonacci Series number is 89. This will be explained later in the paper. It concerns a delay of new material to prepare the next G. S. point.

The second is not a true occurrence since it uses parts of the preceding and following one. 14 + 30 = 44 / 2 = 22. Of unknown significance is the fact that it falls halfway between the start of the canon and the 2nd theme. Perhaps there is a binary form to the canons. This was common in early canonic and fugal writing. This is also a factor in the importance of m. 22. It is significant in three ways: the one discussed; the metric patterns that converge, and the cell y and z that come together at that point. Later, the connection with the *Cantata Profana* counterpoint will be made clear.

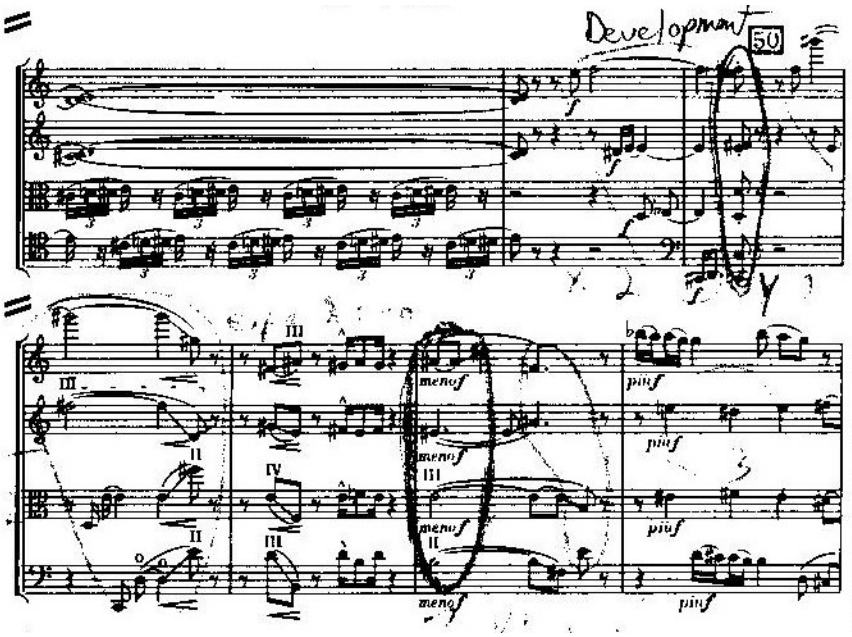


Figure 10: *Fourth String Quartet*, I mm. 48-54

**Development Section**

The development section shows a similar pattern. The section starts at m. 49 (Figure 10) and then six measures later at m. 55 there is a new texture with canonic imitation between the vn. 1 and the vc. This canonic figure bears strong resemblance to the theme at m. 35. This is strengthened in the same way that occurred at m. 22 by a strong z-cell at m. 53.

**RECAPITULATION**

It would seem that our series breaks down at the next number in the series – 89. Here again the new material is offset from the beginning of a stretto by eight measures. The recapitulation begins at m. 92 with the main theme, which leads to the stretto at m. 101, eight measures later. This is the same way the main theme led to the

stretto at the beginning of the movement. After 100 measures to be off by 3 is not a large error. And consider the metric character of the 10 measures preceding the recap. Bartók uses a shifting rhythmic pattern that moves back to the barline by the use of an x-cell in the same way as at the beginning of the movement. Here again is that familiar pattern of three eighth notes – two sixteenths – eighth.

Look at the way that the recap structure reflects the exposition.

| **MainTheme** | **Stretto** | **Stretto** | **Canon** |
|---|---|---|---|
| 1 | 5 | 8 | 14 |
| 92 | 96 | 101 | 105 |

## GOLDEN SECTION AND CANONIC FIGURES IN QUATRAIN STRUCTURE

The Golden Sections for the movement with its 161 measures would be expected to fall at 60 – 61 and at 99 – 100. When we look at mm. 60 and 61, the same canon occurs that occurred at m. 14 and m. 106. And what occurs before it?

| **MainTheme** | **Stretto** | **Stretto** | **Canon** |
|---|---|---|---|
| 49 | 54 | 58 | 61 |

These are based again on the familiar x-cells and that same rhythmic pattern. There is a small difference in the number of measures, but it is not so large that it cannot be seen as a difference in treatment and key.

At this point it might be appropriate to note that the main theme is important for the Golden Section, but that the Canon is the theme that determines where

the sections intersect. The way that the series is defined is by fugal imitative devices, not just important themes. Bartók was evidently considering these imitative devices as his main integrative structural units.

**Golden Section**

| | 1 | 60-61 | 99-100 |
|---|---|---|---|
| **Main** | 1 | 49 | 92 |
| **Stretto** | 5 | 54 | 96 |
| **Stretto** | 8 | 58 | 101 |
| **Canon** | 14 | 61 | 105 |

If the G. S. is recalculated for the proportion of the Canon to the end of the movement, 161 – 14 = 147 * .618 = 90.846 + 14[to adjust to the beginning] = 104.846. This would give the exact beginning of the third beat of the 104th measure. The same thing does not work for the other G. S. 161 – 14 = 147 * .382 = 56.154 + 14 = 70.154.

Perhaps Bartók forgot to add the 14 beginning measures back in for the first section. This would have prevented previous students of Bartók from seeing the G.S. in this movement. There is another stretto at m. 70 and a definite articulation point at the middle of the 70th measure. This goes back to Bartók stating that the development began at m. 50 in his published analysis.

**Bartók planned well**

In some of Bartók's earlier works, Lendvai and Howat have shown that Bartók was planning and executing the use of the G.S. or Fibonacci Series as a means of

formal structuring. Bartók uses these in conjunction with folk elements to give form to his third movement.

> One might still argue that Bartók was unaware of the significance of the numbering here. In that case, the same would have to apply to many other obvious or fundamental relationships: the 1-2-3-5-8-5-3-2-1 sequence of the xylophone solo already mentioned in the Music for Strings; some of the 'Bulgarian' meters in pieces such as the finale of *Contrasts* (13/8 divided principally 8 + 5, with smaller divisions of 3 + 2 + 2, etc.); the intervallic 2-3-5-8 semitone aspects of pentatony; and some important motivic progressions identified by Lendvai (1971: 36-9, 49); from the *Miraculous Mandarin*, Dance Suite, Sonata for Two pianos and Percussion and *Divertimento*, based on progressive spans of 2, 3, 5, 8, 13 and then sometimes 21 semitones. This would also have to apply to Bartók's own numbering of the bars, with their Fibonacci divisions, in the manuscripts of the Fugue from the Music for Strings and the third movement of the Fourth Quartet.[18]

In the third movement of the Fourth Quartet the overt simplicity of a cello solo with chordal accompaniment belies the underlying sophistication of the movement. The solo part is evidence of Bartók's folk studies and the melodic transformations that these studies helped him to develop. According to Howat in the previous quote, the third movement of the *Fourth String Quartet* combines Fibonacci elements inserted by the composer. In this next writing we are made aware of the impact that these early studies had on him.

> In the meantime [the gipsies] transformed everything they offered to their public. Finally, they deformed the parlando-rubato melodies, with excessive rubato and with florid, superimposed embellishments, until they made them unrecognizable. They made use of the rubato in a special way in melodies with strict rhythm: certain small melodic portions of equal length (for instance, each couple of measures) remain equally long temporally, while inside these measures the value of the quarter-notes, for example, is variable. As for melodic line, the gipsies

[18] Roy Howat, Review-Article: "Bartók, Lendvai and the principles of proportional analysis," Music Analysis 2:1 (1983), 86-87.

> adopted the augmented second, absolutely unknown in Hungarian music . . . As to the dance melodies in tempo giusto rhythm, they overloaded them with strange embellishments which recall certain ornamental passages of Western music.[19]

The first overall organizing factor is the variations of the cello and the way that they are organized in the same way that Bartók discussed in the quote above. He takes a simple theme and then embellishes it in measures 10 – 13 and mm. 18 – 20 in a similar fashion to the way he discussed in the essays. The embellishment of melodies that he discovered in his research was related to the Western art music of his tradition.

> To avoid any possible misunderstanding, mainly in the interest of readers of non-Hungarian musical mother tongue, while speaking about rhythmic styles let us add that the two different *poco rubato* variations in the movement (I, III) do not intend to refer to any concrete folk music rubato, any parlando-rubato style that was known to Bartók. It was naturally in the wake of the repeatedly recurring folk music inspiration that the parlando-like performance itself assumed countless forms and stylistic variants in his music.[20]

These variations show the further development of the technique evident in the third movement of the quartet, although Somfai is speaking about the second movement of Bartók's *Violin Concerto* (1937 – 1938) that was written after the *Fourth String Quartet* (1928). The many forms and style variants of the embellishments became a common element in his music.

The Fibonacci Series numbers are clearly marked out for us at the main junctures. These markings show the divisions of the solo and the accompaniment. The held chord of the accompaniment is subdivided into 2 + 3 and takes us through m. 5 to

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[19] Béla Bartók, *Essays* ed. Benjamin Suchoff (New York: St. Martin's Press, 1976), 70.
[20] Lázló Somfai, "Strategies of variation in the second movement of Bartók s Violin Concerto 1937-1938," Studia Musicologica 19 (1977), 189.

where the cello starts. The second division is at m. 13 where a new chord and solo appear. The next begins at m. 22 after the marked division at the end of m. 21. This brings us to the major division at m. 34.

Part 2 or the B section begins with the stylistic change in m. 34. The B section ends with the cadential dyad CE and the return of the cello melody at m. 55. This time it is in canonic imitation with the violin.

| A | B | A |
|---|---|---|
| 1-33 | 34-54 | 55-71 |

Underscored indicates a Fibonacci.

Each of the three Golden Sections can be broken down further. In the same way that the first movement uses a four-part thematic structure, here the sections each contain four phrases.

| | A | B | A |
|---|---|---|---|
| A | 1-5 | 36-37 | 55-57 |
| B | 6-13 | 37-41 | 58-59 |
| C | 14-21 | 42-49 | 60-63 |
| D | 22-34 | 50-54 | 64-71 |

The Recapitulation is shortened, as one would expect. This is also similar to the pattern seen in the *Fourteen Bagatelles*. A repeat is not typically as long as the first statement. The last phrase is the coda that delays the drive to the cadence and reverses the contraction process. The last measure has been added in the same fashion as seen in

the *Fourteen Bagatelles*. It is unnecessary, unless to create the correct number of measures for the Golden Section proportions.

In the third movement, Bartók shows the quatrain structure in a way that is very close to the original quatrains of folk songs. He spent years transcribing them and this work shows the results of this experience. Here Bartók uses a simple song type of structure instead of the more complicated structures of the first and fifth movements. The purpose here was to give the individual instruments an opportunity to display the lyricism they are capable of. What better way to show this than in a folk song style?

One would expect that there is a folk song that Bartók heard in a small village that was the pattern for this movement. Or it could be that Bartók was making an idealized version of what a folk song could be if it was set in masterful fashion.

A feature that speaks strongly for this interpretation is the cadential type movement of the cello in measures 9, 13, 21, 28 and 34. These imitate the way that a folk song has frequent cadential figures. Cadences give a feeling of a slow pace that allows the listener to relax and enjoy the lyricism that Bartók is trying to create.

## RELATION OF THE FIRST AND FIFTH MOVEMENTS

The last movement of the fourth quartet also is organized by the Golden Section. In this case, the section joins with the rhythmic motive of the x-cell in the first movement to create an organizing effect. This treatment is like the thematic usage in Bartók's only *Piano Sonata* of the year 1926. A year that saw the production of many of Bartók's best piano works.

> The germ from which the thematic development of this first movement stems is the short head-motif, which Bartók early exposes within the first thematic area in two archetypes. These differ decisively in their rhythmic and metric position

within the prevailing duple time. The first archetype and its rhythmic variants function in the exposition as an articulatory 'signal', heralding the onset of new themes.[21]

In the Fourth Quartet written two years later, a similar idea occurs with the x-cell motive that ends both the first and fifth movements and can be found at different structural points throughout the quartet.

Another motive is active in the fifth movement. The bowed chords in the style of village fiddlers announce the Golden Section divisions. They open the work in m. 1. Then in mm. 120 to 140 they reappeared to prepare the cadence before the B section that starts at mm. 149-152. Part 3 begins in m. 238 with the fiddler's chords that opened the movement again telling us that the recapitulation was beginning with their restatement in 242.

Calculating the exact measurements:

| | |
|---|---|
| 392 * .382 = 149.744 | 392 * .618 = 242.256 |

A common thread links the last movement of the fourth string quartet and the first movement. This thread first appears at m. 7 of the first movement in the cello. Immediately it begins to be used to build the new melodic material for the quartet. These rhythmic motives help make a coherent whole. Bartók in this music is attempting to find new ways to solve existing forms.

[21] László Somfai, "The 'Piano Year' of 1926," The Bartók Companion ed. Malcolm Gillies (London: Faber and Faber, 1994), 175.

> The first and last movements of the work – that is, its pillar movements – are connected by the cyclic principle. What played a relatively subsidiary role in the first movement (Bartók describing it as no more than transitional material) here appears as a principal theme and plays a dominating role in the whole movement's thematic work. . . . The four-note motif appearing as principal theme bore certain traces of Arab folk music even in the first movement: these come forward now even more unambiguously as a result of the rhythmic character and the drum-beat accompaniment.[22]

Karapati does not differentiate between the motive first seen in measure seven and the segment that becomes the canon in measure 16. This segment and the sixteenth – note segment that usually occurs in a type of stretto figure become the fabric from which the rest of the quartet is woven.[23] The first segment that we will call a, can be seen as part of the polymeter that precedes the Fibonacci point of mm. 21 – 22. The second segment that we will call b, can best be seen in mm. 33 – 34, the next Fibonacci point. They also lead into the Fibonacci point at m. 55 and the beginning of the development at m. 50 that immediately precedes it.

The exact restatements also have important functions. They are found at the end of the first section mm. 26 – 28 and at the end of the development, mm. 84 – 93. They also begin the recap at mm. 93 – 96. Later they return at the end of the Coda mm. 153 – 161.

No exact restatements occur until the fifth movement. In it, the a segment that was used as a canon at m. 16 becomes the main theme of the movement. In this movement (like the first), the segments of the main theme are the building blocks that help create the larger form.

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[22] János Kárpáti, "Early String Quartets" in Bartók 's String Quartets trans. By Fred MacNicol (Budapest: Corvina Press, 1975), 223.
[23] Elliott Antokoletz, "Principles of pitch organization in Bartók 's Fourth String Quartet" (Ph.D. Dissertation: City University of New York, 1975), 120.

## MOTIVIC LINKING OF THE FIRST AND FIFTH MOVEMENT

In the fifth movement the original motive becomes an important source for canonic and motivic development just as it did in the first movement. The section between mm. 215 and 237 shows this clearly. First the motive is half inverted and then segmented. Then at m. 220 it becomes the source of a (double) canon between the paired violins and the cello and bass pair.

The x-cell motive helps to create a dome shape in the final movement as well as the overall quartet. It occurs in the first movement and last movement creating a type of cyclic dome shape or arch form.[24] In the fifth movement the motive begins and ends the first part. At measure 15, the motive moves forward. At the end of the first part in measures 145-148 the motive is retrograde. This movement shows an overall sense of moving up then back in a wave motion that adds to the sense of return in the overall arch form. The fiddler style chords already discussed come just before and immediately after the second part in an arch form that again helps create the feeling of departure and return over a large structure.

> The vehicle for foreground prolongation in the excerpt under discussion – the first 148 measures of the [4th] movement – is the departure-return pattern, the "nesting" of which generates large-scale prolongation. Both the departure-return model and the nesting process have been discussed in the literature, chiefly from the perspective of prolongational significance.[25]

Morrison has observed the way that the segments are layered around the important structural points in order to delay the return of the theme to its original form.

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[24] Jean Little, Architectonic Levels of Rhythmic Organization in Selected Twentieth-Century Music (Ph.D. Dissertation: Indiana University, 1971), 309.
[25] Charles D. Morrison, "Prolongation in the Final Movement of Bartók 's String Quartet No. 4" Music Theory Spectrum 13/2 (Fall 1991), 180.

In this instance, the entire quartet lies between and is part of the "nesting process." The size of this departure and return can be seen in the way that the first statement of the main theme in m.7 is prolonged through the end of the fifth movement. There is no literal restatement of the theme from m. 161 of the first quartet, until m. 219 of the fifth movement.

> In Bartók's asymmetrical ('non-periodic' and polyphonic) way of writing it is not usually the number of metric units that determines proportion but the number of thematic units or motivic 'waves' – as in the great fugue of Music for Strings.
>
> In some instances the effect of other elements, like strong dynamic effects (e.g. bass-drum strokes, or, in a canon, the number of entrances), eclipses the role of the metric units. At the very end of the Fourth Quartet, we clearly perceive that 3 motivic 'waves' are answered by 5 motivic 'waves' (bs 365 – 74 and 375 – 85).[26]

Waves appear instead of units. Looking at the fifth movement, there is quite a lot of evidence of an ocular nature to support this view. The beginning of the movement has its motivic waves as well. The steady rhythm of the lower parts allows the wave of melody in the violins to be evident after m. 11 and continuing until the interruption of part two at m. 151. And as Lendvai observed they recur in the return at the end of the movement.

This new style of writing continues to be used by Bartók in later compositions. These sweeping movements of melody can be seen as anticipating the rising and falling motion of the type that would continue in the fifth quartet.

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[26] Ernő Lendvai, "Remarks on Roy Howat's *Principles of Proportional Analysis*," Music Analysis 3:3 (1984), 259.

**Conclusion:**

Bartók gave us the analysis of the fourth quartet in the printed edition. We know where the sections start. These sections in the first and third movement have been shown in this analysis to be based on treatments different from the traditional theme and theme group of the Sonata form.

It might be good to take some time to look at some of our traditional viewpoints on Sonatas and thematic relationships. Like many of our questions about the form in this quartet, it is possible that other works use these kinds of relationships. Bartók was working and performing with many other composers of his generation all over Europe during the time this was written. If he influenced them or they influenced him there is a good chance that this type of writing could be found in the works of other composers as well.

Folk idioms are well known to be influential throughout the first half of the twentieth century. How these are incorporated into the musical forms and styles will continue to be a lively topic for discussion. Each note could be explained in Bartók's works[27]. All the notes bear the influences of his early study of folk music with Kodaly and the painstaking transcriptions he performed.

[27] Bernard Rands. "The use of canon in Bartók's Quartets," Music Review 18/3(August 1957) 183-188.

# Chapter Three

## The *Twenty Hungarian Folk Songs(1929),*

## *Eight Hungarian Folk Songs(1907-1917)* and

## *Music for String Instruments, Percussion*

## *And Celesta(1936)*

Belá Bartók explained in his "Harvard Lectures" many of his compositional techniques. These include the "modal chromaticism" that he developed from the combinations of two modes and later the development of the melodies that "have at least eight half-tones and cover, in some cases, the distance of an octave or more." For instance, in *Music for String Instruments, Percussion and Celesta* the implied bimodal construction that Bartók cites as the fugue subject and also movement 2 of the *Fourth String Quartet*. (See example 13 on page 51 from the Harvard Lectures in *Essays*) It shows a chromatically filled in pitch set, in *Music for String Instruments, Percussion and Celesta,*

A – Bb – B – C –C# - D – Eb - E

And in the *Fourth String Quartet*,

E - F – F# - G – Ab – A - A# - B.

Each quote is 8 notes with 7 half steps. This range separated them from the folk melodies that he had studied in his research.[28]

> In these eight conferences I am going to explain to you the main characteristics of the "New" Hungarian art music. (Illness forced the cancellation by Bartók of half the planned conferences or lectures which were begun in February 1943 at Harvard University.) . . . In modern painting we can observe similar tendencies. First came the elimination of objects and the exclusive use of various lines, curves, and geometrical forms without any allusion to external shapes existing in nature. These lines, curves, and so forth were used according to certain plans, purposed to give and equilibrium and a harmonious unity to the picture. Kandinsky was the first painter who tried this style and achieved considerable results. . . . It seems that the proportions, the placing of squares and circles whether filled in or empty, as well as the distribution of black and white in well-chosen balance are very important which should be radiated by the picture! . . . Here we have a remarkable phenomenon: the simutaneous appearance of similar revolutionary tendencies in all three branches of the arts – painting, literature and music.[29]

I make my apologies for the considerable latitude in combining portions of the previous quotes. Hopefully no violence was done to the composer's intent. The discussions are worth reading in their full versions. The quotes were carefully excised to maintain their full intent. Without connecting these quotes the underlying meaning tends to be lost. Namely that he was connecting the proportions to this new movement in music.

> I used the term "bi-modality," a little-known designation. There are, however, two other, very frequently used terms, I would almost say "slogans": *atonality* (or twelve-tone system) and *polytonality* (if only two parts are concerned: bi-tonality). Polytonality means the use of different diatonic keys in music of two or more parts, each part in a special key. . . . Real or "perfect" atonality does not exist, even in Schoenberg's music because of that unchangeable physical law

[28] Béla Bartók: *Essays,* ed. by Benjamin Suchoff. (New York: St. Martin's Press, 1976), 376.
[29] ibid. 354-358.

> concerning the interrelation of harmonics and, in turn, the relation of the harmonics to their fundamental tone. When we hear a single tone, we will interpret it subconsciously as a fundamental tone. When we hear a following, different tone, we will – again subconsciously – project it against the first tone, which has been felt as the fundamental, and interpret it according to its relation to the latter. . . . Polytonality exists only for the eye when one looks at such music. But our mental hearing again will select one key as a fundamental key . . . our hearing cannot perceive two or more different keys with two or more different fundamental tones, as such; it will simplify matters by reducing the maze of key to one principal key.[30]

Notice that he draws our attention to the laws of harmonics and their relation to the fundamental tone. It relates back to the proportions that he drew our attention to in the previous quote. So we have the composer discussing proportions with harmonics and their relations in the same lecture. He contends that the natural laws create the relation of harmonics to their fundamental tone.

> My music, looks as if it is bitonal or polytonal. . . . Now we may go back to our discussion of our modes. Just as the two types of the minor scale can be used simultaneously: two different modes can be used at the same time as well. . . . As the result of superposing a Lydian and Phrygian pentachord with a common fundamental tone, we get a diatonic pentachord filled out with all the possible flat and sharp degrees. . . . however, the flat and sharp tones are not altered degrees at all; they are diatonic ingredients of a diatonic modal scale. If we examine these two modes, we will see first that the upper one is a Phrygian, the lower a Lydian mode. And secondly, we will see that the upper halves of both modes are exactly the same relation as the upper halves of the two minor scale types. . . . But not only can different modes be superposed . . . we may say that music based on such principles can be labeled with a third "slogan": bimodality or polymodality. . . . So if we say our art music is polymodal, this only means that polymodality or bimodality appears in longer or shorter portions of our work, sometimes only in single bars. . . . To point out the essential difference between atonality, polytonality, and polymodality, in a final word on this subject, we may say that

[30] Béla Bartók: *Essays,* ed. by Benjamin Suchoff (New York: St. Martin's Press) 1976. 365-366.

> atonal music offers no fundamental tone at all, polytonality offers – or is supposed to offer – several of them, and polymodality offers a single one.[31]

This is all leading us up to an axiom: "therefore our music, I mean the new Hungarian art music is always based on a single fundamental tone." The many different tones of the combined modes are formed into a single mode that has a root or fundamental pitch. He is telling us not to be mislead by atonality or polymodality and deciding that the large number of pitches are not related to a single key.

> Our next subject is the description of a new chromaticism. Before I go into details, I must recapitulate in regard to what results the superimposing of the various modes led us to. First, a kind of restricted bi-modality or polymodality. Second, bi-modality led toward the use of diatonic scales or scale portions filled out with chromaticized degrees which have a totally new function. They are not altered degrees of a certain chord leading to a degree of a following chord. They can only be interpreted as the ingredients of the various modes used simultaneously and at a given time, a certain number of the seemingly chromaticized degrees belonging to one mode, other degrees to another mode. These degrees have absolutely no chordal function; on the contrary, they have a diatonic-melodic function. This circumstance is clearly shown if the degrees are picked out and grouped into the modes to which they belong.
>
> This modal chromaticism (as we will call this phenomenon henceforward, to discriminate it from the chordal chromaticism of the nineteenth century) is a main characteristic of the new Hungarian art music. Another and different characteristic, as you will probably remember, is the appearance of pentatonic melody structures in our work, as a contrast – so to speak – to the modal chromaticism, although both may be combined.
>
> Now, the frequent use of modal chromaticism quite gradually gave me the idea to try a kind of melodic new chromaticism, developed quite subconsciously and instinctively. By the way, the working-out of bi-modality and modal chromaticism happened subconsciously and instinctively, as well. I never created new theories in advance, I hated such ideas. I had, of course, a very definite feeling about certain directions to take, but at the time of the work I did not care about the designations which would apply to those directions or to their sources.

[31] Béla Bartók: *Essays,* ed. by Benjamin Suchoff (New York: St. Martin's Press) 1976. 366-370.

> This attitude does not mean that I composed without . . . set plans and without sufficient control. The plans were concerned with the spirit of the new work and with technical problems (for instance, formal structures involved by the spirit of the work), all more or less instinctively felt, but I never was concerned with general theories to be applied to the works I was going to write. Now that the greatest part of my work has already been written, certain general tendencies appear – general formulas from which theories can be deduced. . . .
>
> As to the general characteristics, exactly the same can be said about my melodies as what I said already concerning the chromatic folk melodies. That is, the single tones of these melodies are independent tones having no interrelation between each other. The main difference between the chromatic folk melodies and my own chromatic melodies is to found in their range. The former consist exclusively of five, six, or at most seven half-tones, which corresponds to a range of about a fourth. My own melodies generally have at least eight half-tones and cover, in some cases, the distance of an octave or more.
>
> The working with these chromatic degrees gave me another idea which led to the use of a new device. This consists of the change of the chromatic degrees into diatonic degrees. In other words, the succession of chromatic degrees is extended by leveling them over a diatonic terrain.[32]

As Bartók states, he has brought out the proportions of nature, the relation of harmonics to the fundamental and stated that his new system used at least 8 half steps. A tremendous amount of frustration on my part could have been avoided, had I known that quote before analyzing several hundred pieces by Bartók.

I had discovered that many pieces of Bartók were based on a scale containing eight half steps, as cited above in *Music for String Instruments, Percussion and Celesta* and the *Fourth String Quartet*. What was the basis of this scale? The scale was in most cases occuring in these early pieces that we have been examining that use the Golden Section proportions and the Fibonacci Series. The same set of *Twenty Hungarian Folk Songs* that we discussed in the first chapter in relation to form are some of the best

[32] Béla Bartók: *Essays,* ed. by Benjamin Suchoff. (New York: St. Martin's Press, 1976), 376-381.

examples of these scales in use. These are going to be discussed in detail later in this chapter.

## FIRST SET OF THE TWENTY HUNGARIAN FOLK SONGS

First, we will see that he related the scale to derivations other than modal. The first set of folk songs in the *Twenty Hungarian Folk Songs* provide a wonderful example of this. All four of the songs are organized by means of the Golden Section. The second of the four is of special interest in that it based almost entirely on fifths. In German the title is *Traurige Weise.* It is 49 measures long with the return of Tempo I and the original melody at measure 31, precisely as predicted by the Golden Section proportions. The first chords are open fifths. These are the tonic and dominant, respectively of the two keys that Bartók said were the basis of his "new chromaticism" in the previous quotes. We have the tonic fifth (F and C) of the Lydian mode, then in the next measure the tonic fifth (E and B) of the Phrygian mode.

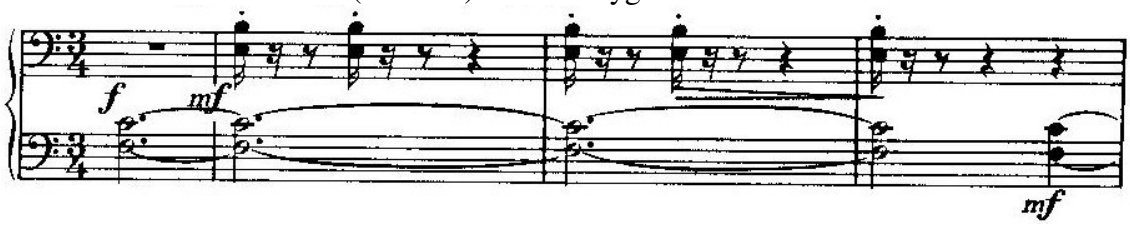



Figure 11: *Twenty Hungarian Folk Songs*, I - 2

At measure 9 a change occurs. Two fifths stacked on top of one another start the next sequence. These notes are still from the Phrygian mode. The other fifth receives a similar treatment, remaining in Lydian mode. Measure 14 sees the addition of another fifth to each set of fifths. This pattern continues until the "negative G. S. point" where five notes are stacked making four intervals of a fifth. I would like to point out the

curiosity that the ending of the piece is measure 49, but the cadential extention begins at measure 44. If one places the end of the piece at that point then the G. S. would fall at the end of measure 27, exactly where the cadential pattern ends with the new material leading to the Tempo I and return at measure 31. This is not unlike what we saw in the *Fourth String Quartet* earlier.

The nine pitches involved in the stacked fifths are a segment of the circle of 5ths.

Bb – F – C – G – D / A – E – B – F# - C#. This is the texture from 21-27 with a melody of D - C – Bb - G – F, that is the representation of that segment of the circle of 5ths. Then the rest of the section to the end is a playful juxtaposition of $5^{ths}$ and triads filling in the fifths. The melody continues using that same pitch collection from the circle of 5ths.

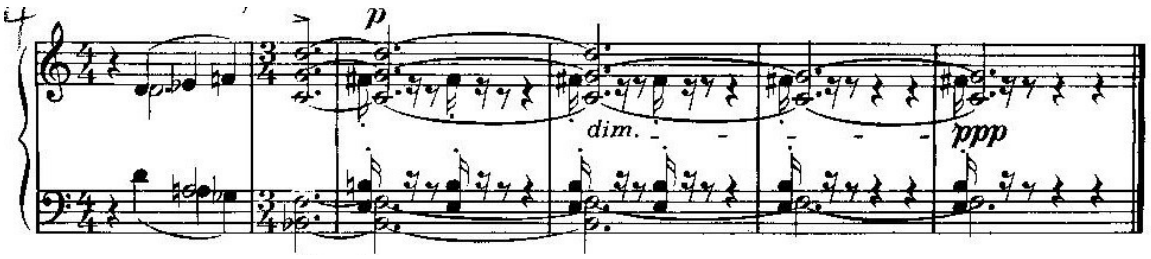



Figure 12: *Twenty Hungarian Folk Songs*, I – 2 mm. 44-49

Then the "cadential extension" begins that gives us the pitch collection that we have been seeking. Here it is built out of that same segment of the circle of fifths with a couple of added notes. C – ^ -D – (Eb) - E – F – F# - G – ^ -A – Bb – B. This is the interesting pitch collection that I have found in many different places in Bartók's work. The Eb would seem to be a problem but two other examples of inserted Eb's will show that this was not an anomaly. This is surely the modal chromaticism that Bartók referred

to in his lectures. He explained that his melodies involved at least 8 or more half steps. As you will notice the collection above comprises exactly 8 notes separated by half steps.

As so many before us, we had examined the third movement of the *Fourth String Quartet* and perhaps like Antokoletz in one of his lectures, suggested that the third movement coda contained an incomplete circle of 5ths. The circle of 5ths refers to the fact that when one starts and moves up a 5th and continues on, eventually one reveals all of the possible notes of our modern scale. Therefore any possible collection of notes can be shown to be from segments of the circle of 5ths. Any other explanation of a collection should receive strong consideration. The circle of 5ths is in fact the way that our modern musical scale came to be created. We have seen this connection in the preceding example. Notice the similarity with Figure 14, from the *Fourth Quartet*.

C#- D - D# - E - F# - G# - A - B

The section marked Coda has this collection that contains the pitches of the long notes in this section. The pitches of the last two measures with the last beat of the measure before are part of this collection: D – A – E – B – F# - C# - G#. These can be explained through the stacking of fifths. Notice the similarity from the held notes of the first part of this movement, mm 1-13.

C# - D - D# - E - F# - G# - A - B

0 - 1 – 2 – 3 ^ 5 ^ 7 – 8 ^ 10 ^

What about the melodies? These are examples of the new melodies that the composer discussed in his Harvard lectures. They are constructed of chromatic tones of various numbers.

My first "chromatic" melody I invented in 1923; I used it as the first theme of my Dance Suite. . . . This kind of melodic invention was only an incidental digression on my part and had no special consequences. My second attempt was made in 1926: on that occasion I did not try to imitate anything known from folk music. (There is a note for a number of examples. We will look at the Cantata Profana: fugue theme. The Fourth String Quartet, second movement, is another) I cannot remember having met this kind of melodic chromaticism deliberately developed to such a degree in any other contemporary music.

As to the general characteristics, exactly the same can be said about my melodies as what I said concerning the chromatic folk melodies. That is, the single tones of these melodies are independent tones having no interrelation between each other. There is in each specimen, however, a decidedly fixed fundamental tone to which the other tones resolve in the end. The main difference between the chromatic folk melodies and my own chromatic melodies is to be found in their range. The former consist exclusively of five, six or at most seven half-tones, which corresponds to a range of about a fourth. My own melodies generally have at least eight half-tones and cover, in some cases, the distance of an octave or more.

The working with these chromatic degrees gave me another idea which led to the use of a new device. This consists of the change of the chromatic degrees into diatonic degrees. In other words, the succession of chromatic degrees is extended by leveling them over a diatonic terrain.[33]

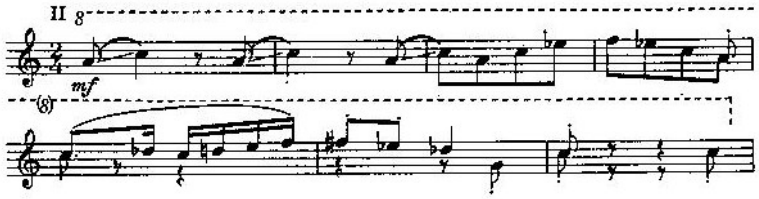



Figure 13: Example from Harvard Lectures in *Essays*.

The melodies of this movement are similar to the first eight measures.

C – C# - D – D# - E - - G – A – B

[33] Béla Bartók: *Essays,* ed. by Benjamin Suchoff ( New York: St. Martin's Press, 1976), 379-381.

Six chromatic steps move from B to E. The later melodies progressively add steps until all are filled. This collection is in measures 9-13.

E – F – G – G# - A – A# - B - C

So to reiterate, there are melodies of consecutive half steps that we see above. The question should be asked whether the half steps continue to be consecutive when "extended by leveling them over a diatonic terrain". There is a progression and development that can be seen through the third movement and into the fourth. The collection that has been found in the held notes of the third movement is also found in the fourth. Is the composer trying to demonstrate the connection of the "chromatic melodies" to his "new chromaticism?" What relation do they have to the circle of fifths? The connections could be seen in the way that the melody of eight half steps leads into the end of the third movement. There we found a collection constructed from the circle of fifths that relates to those new melodies we have identified as the "new chromatic melodies."

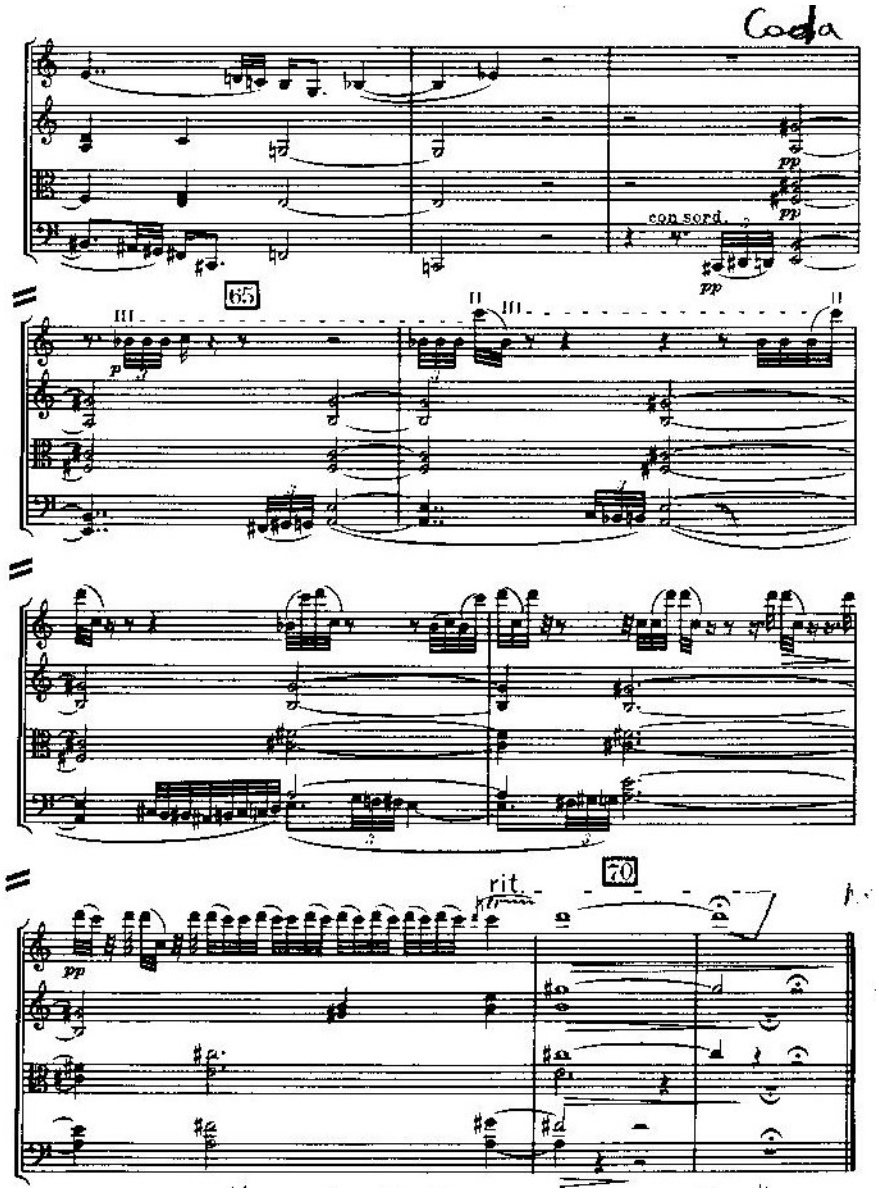



Figure 14: *Fourth String Quartet*, III mm. 62-end

At the beginning of the fourth movement the pitch collection that has been formed from the circle of fifths and formed the harmonic context now comes to the front as the melody. The viola and second violin parts that comprise the melody from

measure 5 to measure 21 (Fibonacci numbers) are constructed from the same collection we found in the folk songs earlier.

C – Db – D – Eb – ^ - F – Gb – G – Ab - ^ - Bb - ^

Next, the melody moves into the mode that the composer discovered on one of his collecting tours. This closely resembles the Rumanian mode from the Banat district. Bartók said that it was used in aeolian mode with the following segment: F – G – Ab – Bb – C – [D].[34] The cello plays in the pitch collection: C – D – E – F – G – Ab – Bb. This is turn can then be seen to be related to the melodies of the previous movement: D – Eb – F – G – Ab – Bb in measures 13-17.

This new chromatic collection that we found at the beginning of this fourth movement of the *Fourth String Quartet* is also the first melody found in the fourth movement in the *Music for String Instruments, Percussion and Celesta.* It should not come as a surprise that the collection is found in measures five to 21, just as in the quartet. The collection will also be looked at in the opera *Bluebeard's Castle* and in the *Cantata Profane.* This chapter is on the two folk song collections and they are examined next.

Bartók in his quotes at the beginning of the chapter, introduces many ideas. Among them are the relationship of the proportions to the whole in art, that is one of the way that Golden Section is manifest. It has been used from ancient times as one of the guiding principles of balanced design. He went on to discuss the harmonic's relation to the fundamental that makes truly atonal music impossible. The harmonics always relate to their reason for being, the original note from which they sprang. From the chromatic

[34] Belá Bartók, *Rumanian Folk Music* vol II, ed. By Benjamin Suchoff. (The Hague, Netherlands: Martinus Nijhoff, 1967), 17.

usage of the melodies using combined modes, he went on to, as he put it,"another idea which led to the use of a new device." This was to spread these notes over a "diatonic plane". When this occurs, one has the choice of where to put the gaps. We will see that a favorite form occurs in the vocal fugue of the *Cantata Profane*. This is when 8 half steps are grouped with whole tones filling the octave. Another form, from the second of the *Twenty Hungarian Folk Songs*, has two x-cells with a gap to spread the chromaticism over a wider area.

This new melodic material that the composer developed is naturally related to the x-cells that became a notable part of his music. These melodies have segments of half steps that cannot be explained through the traditional modes. As early as *Bluebeard's Castle*, that predates twelve-tone theory, there are melodies constructed with chromatic sequences. The symmetrical constructions of Bartók found here a fertile ground. These melodies with two x-cells in symmetrical array show the composers early use of these "chromatic degrees extended by leveling them over a diatonic terrain."

This should be explanation enough for the theorists. What about those who look for more evidence of Golden Section and the Fibonacci Series in these works? These works have been shown to have many of these characteristics in the largest formal aspects to the smallest motivic and rhythmic details. Not being satisfied with the earlier attempts to put Golden Section explanations on these melodies, I want to propose the following system. If the symmetrical constructions are all the answer that you need, then the "new chromaticism" of the "new Hungarian art music" needs no Golden Section explanation. Then please skip the next two paragraphs and accept that eight half steps is the Golden Section of the octave. When the composer extended the folk melodies to include at least eight half steps, it brought into focus the Golden Section symmetry of the octave.

The ancient Greek philosopher Pythagoras is credited with discovering that if one takes a string and divides it, an octave is created. If one divides the string again, a 5th is created, the 5th an octave and a 5th above the first note. Divide in half again and the note when struck is a $5^{th}$ above the previous. This process is continued going up by 5ths until the entire pitch collection is discovered. This is all general knowledge of the basic physics of music.

What if one did the same thing with the numbers of the Fibonacci Series that is a numerical expression of the Golden Section? One already has the 1,2,3,5 and 8. We already use expanded chords structures that were well known by Bartók's time as an expansion of the normal seventh chords in common use. With the 9, 11 and 13th chords we extend the bounds of harmonic structure. Why not do the same with the numbered steps as in the manner of 12 tone music championed by Schoenberg? Then the 13th of the Fibonacci Series is the same as a 1. The 21 less 12(an octave) is 9. The 34 less 24 (two octaves) is 10. The 55 less 48 (four octaves) is 7. The 89 less 84 (seven octaves) is 5 that we already had derived. The 144 divides evenly by 12 so it already is present, an octave.

This expanded series is 0,1,2,3,5,7,8,9,10 and 12. This is remarkably like a scale, although there are too many notes.

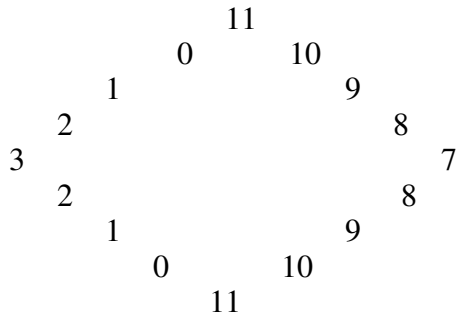
> Second, bi-modality led toward the use of diatonic scales or scale portions filled out with chromaticized degrees which have a totally new function. They are not altered degrees of a certain chord leading to a degree of a following chord. They can only be interpreted as the ingredients of the various modes used simultaneously and at a given time, a certain number of the seemingly chromaticized degrees belonging to one mode, other degrees to another mode. These degrees have absolutely no chordal function; on the contrary, they have a

> diatonic-melodic function. This circumstance is clearly shown if the degrees are picked out and grouped into the modes to which they belong.[35]

Antokoletz in his many articles on the subject has exhaustively demonstrated this. It is one half step short of the at least 8 half steps of the composers "new chromaticism," unless he was including the two whole steps in stretching it to the octave.

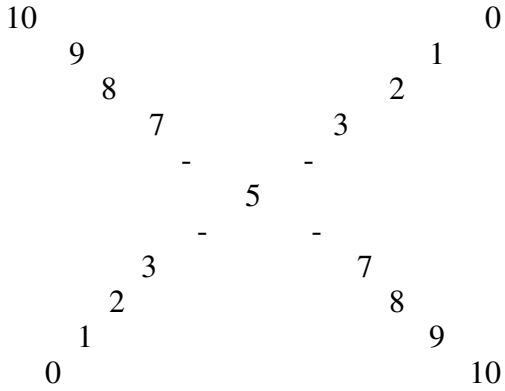
> My own melodies generally have at least eight half-tones and cover, in some cases, the distance of an octave or more.
>
> The working with these chromatic degrees gave me another idea which led to the use of a new device. This consists of the change of the chromatic degrees into diatonic degrees. In other words, the succession of chromatic degrees is extended by leveling them over a diatonic terrain.[36]

The interesting thing was my immediate recognition that the group has two x-cells, a y-cell and several possible z-cells. It also is symmetrical in a couple of different directions. 0,1,2,3 is an x-cell in one direction. There is a second x-cell in the other direction. 10,9,8,7 form another x-cell. They are symmetrical around the 11th step.




[35] Béla Bartók: *Essays,* ed. by Benjamin Suchoff. (New York: St. Martin's Press, 1976), 376-381.
[36] Ibid. 376-381.

It is also symmetrical in regards to the 5th step.




There is a y cell running through this construction when one starts with

1,3,5,7, or 3,5,7,9

In musical notes that would equal,

C#, D#, F, G or D#, F, G, A

There are also several pentatonic scales. C, D, F, G, A would be the most obvious. If you can find a whole-tone scale, you use interesting math. It is an obvious derivative however. Also, the octatonic scale isn't present, but could be seen as related.

The z-cell is an obvious result of these combinations as well.

Z – 8/2 = G#, C#, D, G

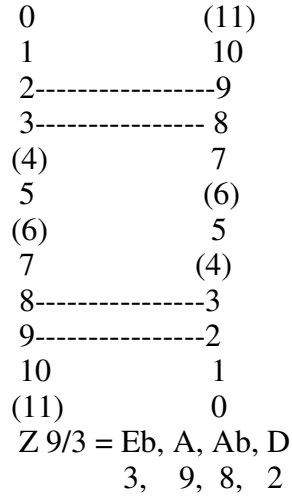
Z – 9/3 = Eb, A, Ab, D

Recalling our form of symmetry, the shift of the missing notes causes a new view of the pattern.

0(C) (11)
1(C#) 10(Bb)
2(D)---------- 9(A)
3(Eb)---------- 8(Ab)
Z – 9/3 Eb, A, Ab, D

This view would be impossible to prove, but it does suggest a possible view of the symmetry involved. There could be other ways to show this. If one looks at the symmetry of the z-cell around the theoretical middle that is missing, it is the same relationship of the notes in the diagrams preceding and following. There is a kind of logic involved, like the square root of -1. It is one of those theoretical fantasies that we have to pretend exist. The formula to derive the Fibonacci Series does use square roots. They exist in this mathematical argument somewhere. My math does not encompass either the square root of negative one or the missing leading tone 11th step of the scale. It is the missing link in both of these symmetrical constructions.

Here is another view of the problem.




Some strong traits of the "new chromaticism" are the lack of a leading tone and tonic triad. This comes from their lack in the modes from which this "new polymodality" was created. These also became characteristic of 20th century music. There are major, minor, diminished and augmented triads that can be created and the Neapolitan chord is clearly present. C – Eb – G, A – C – E, Ab – C – Eb, Db – F – Ab, D – F – A., F – A – C and Eb – G - B. There is only one major – minor or dominant 7th

type of chord, the F – A – C – Eb. This can create a type of faux major scale as the composer did in the first folk song we looked at when combined with the possibility of creating a major chord on the Bb. There could be a leading tone diminished chord on A that would result in a strong feeling of tonality. The subdominant would also be present built on Ab. There could also be Ab – C – Eb – G, and Db – F – Ab - C that form major – major 7th chords.

So it can be seen that there are many ways to create tertian harmonies out of this basic material. One would say if looking at or listening to music written using this scale that there is tertian harmony present, but the normal functions of tonal music are not in effect. This is frequently the case with 20th century music. There are tertian harmonies lacking functional direction in the manner of tonality. If the harmonies are based on these chords then there is no dominant or other chord functions to create functional harmony unless one writes in Bb or Eb. Then a kind of tonality can be created that could look like those major keys or their minors.

This combination of characteristics is evident in later Bartók music. There is a feeling of tonality – through the triadic harmonies. The leading tone is usually absent or not the sure sign post that it is in traditional tonal music. The music that Bartók was writing by the 1930's had gone far afield from traditional tonal music and had much more in common with Schoenberg's 12 tone music. Antokoletz has always maintained that it was free atonality, not serial as Schoenberg and his followers practiced. This paper may show that the organizing factor was not a serial technique but instead a different type of tonal organization that Bartók spoke about in his Harvard Lectures.

After finding indications in Bartók's works of this "new chromaticism" it was frustrating to not at first, be able to find pure examples of the scale. Bartók said that the scale contained at least eight half steps, if they had more it was not a good example of the

pure scale. It should have been obvious to examine the very pieces that had been the best examples of the composer's use of Golden Section in formal considerations. Imagine the chagrin to find it exactly where one would find the purest Golden Section forms.

***FOURTH STRING QUARTET***

The two best examples are works that have already been discussed. The moment when this author knew that he had cracked the code came when he examined the third movement of the *Fourth String Quartet*. This is a movement where Bartók uses many Golden Section devices as were discussed in the previous section.

Look for a moment at our patterns in this movement. The three higher string instruments have separate entrances that sustain to create a vertical simultaneity. These are held for 5 measures through the end of the sixth measure. The entrance of the cello is in the sixth measure and there is a four measure phrase accompanied by repeated iterations of the simultaneity in the upper parts. This is a somewhat static group of pitches. The cello then begins a new four measure phrase with new pitch and melodic material. Notice that the first pattern of 8 – 9 measures repeats at measure 13 – 17. This is again followed by the alternative phrase material in the cello.

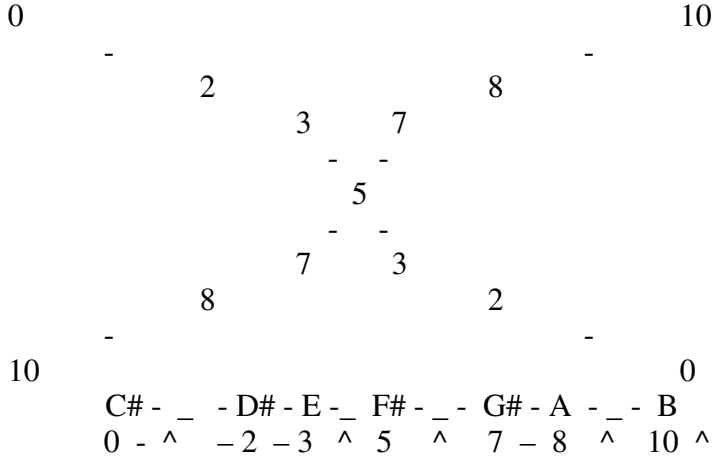
In this we see the familiar pattern from the Viennese Classic period of the periodic structure with four measure phrases combining to form 8 measure phrases that in turn are repeated to form a period. In this case the introductory individual entrances creates a longer than average opening phrase. It also helps to emphasize the Fibonacci number series through the fact that the full simultaneity is not established until the 3rd measure. (Figure 14) The melody starts at measure 5. The first material ends at 8 with new material at measure 9, that cadences at measure 13 where the first 8 measures are

repeated leading us to the cadence at the next Fibonacci number, measure 21. And so on . . .

Now, go back and find the pitch collection for the first 8 (9) bars. We have our upper voices, with G#, F#, E, C#, B and A. Then the cello begins with D# and D, then goes on to add C, C#, B, Eb and E. This e held notes contain the pitch collection:

C# - D - D# - E ^ F# ^ G# - A ^ B
0 – 1 – 2 – 3 ^ 5 ^ 7 – 8 (9) ^ 10 ^

There is a problem here as you notice. The sequence is not correct. This problem should be addressed. We have a missing Bb. It doesn't seem to fit our "new chromaticism". But when you keep running into the same problem over and over, a pattern emerges. The C in this pattern in earlier music could have been described as a lower neighbor. It only occurs where Bartók has two higher notes on either side. (Figure 15) In each case it moves down and then up again quickly. If you notice, it doesn't occur for any length, or on a pitch where there would normally be any rhythmic emphasis. The collections could bear closer examination. The harmony of the first 13 measures is this collection. Notice that this collection is symmetrical around the 5 in the same way that we found in the "new chromaticism."



The melody has that troublesome C that could be explained by lower neighbor, that we looked at previously. An alternate way of looking at this is the "chromatic melody" formation of at least eight half steps.

C – C# - D – D# - E - - G – A – B

Here we can read up from the B – C – C# - D – D# - E. This does not satisfy the requirement, either. From mm. 9-13, we find an expanded collection:

E - F – G – G# - A - A# - B – C

We still lack the necessary number of half steps. If we combine the two we find:

G – G# - A - A# - B – C - C# - D – D# - E

Finally we have found the necessary number of half steps. When we combine the first two collections of long notes of harmony we derive the collection:

F# - G - G# - A ^ B ^ C# - D - D# - E ^

0 - 1 – 2 – 3 ^ 5 ^ 7 – 8 - 9 - 10 ^

The two harmonic collections combine to form the "new chromaticism" in a similar fashion to the folk song collections. In some the "new chromaticism" is the melody, in some it is the harmony. In the third movement, it is found in the harmony. In the fourth movement it is found in the melody.

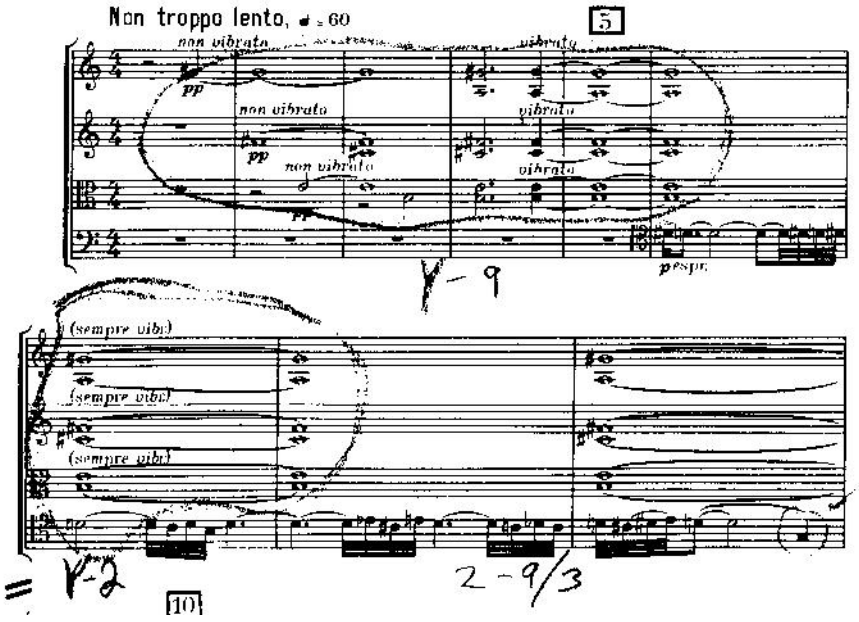



Figure 15: *Fourth String Quartet*, III

In tonal music, it is important to see what the key is at the end when attempting to establish a key. Bartók was very kind to clearly mark off the final section that in this case we will label the coda. It begins at measure 64 after an almost entire bar of silence. The material here is very similar to that at the beginning. In this case the long held notes happen in the lower three voices. Each voice has short interjections of chromatic passages between reiterations of the long notes. If one only identifies the pitches of the longer notes and ignores the shorter notes for the moment, the pitch collection is quite familiar.

C#, D, D#, E, F#, G#, A, B

0, 1, 2, 3, ^ 5 ^ 7, 8, ^ 10 ^

Again one sees the problem with identifying this as the "new chromaticism". We are again missing that 9th scale degree. In this case it is the Bb. This isn't very much of a problem. This is the collection from the first nine bars, that beginning harmony. There is nothing that requires one to use all the notes of a scale when writing a piece of music. In fact, there are always favorite notes in any scale that a composer uses more often than others.

To understand this better, I undertook a new piece using this pitch collection. A famous Irish poem was chosen as appropriate and a song came into being. Immediately, it became apparent that it is much easier to not use all the notes. When that restriction is laid aside, the music can be made to sound like any tertian harmony piece. If too many are left out or too many put in, a strange kind of tonality can be created. It lacks the leading tone functions and like the church modes, the bottom note isn't necessarily the tonic. It comes out as general tertian music without a perceived center in the usual fashion. This describes in general much of the late music of Bartók.

Now back to the Fourth Quartet. Our two scales are still missing members. Can we find an explanation for this problem? What are our two problem notes? The Bb is just missing from the beginning of the piece and the C is a bone of contention. Remember, our scale works, but only if the C can be called a passing tone. (Figure 16)

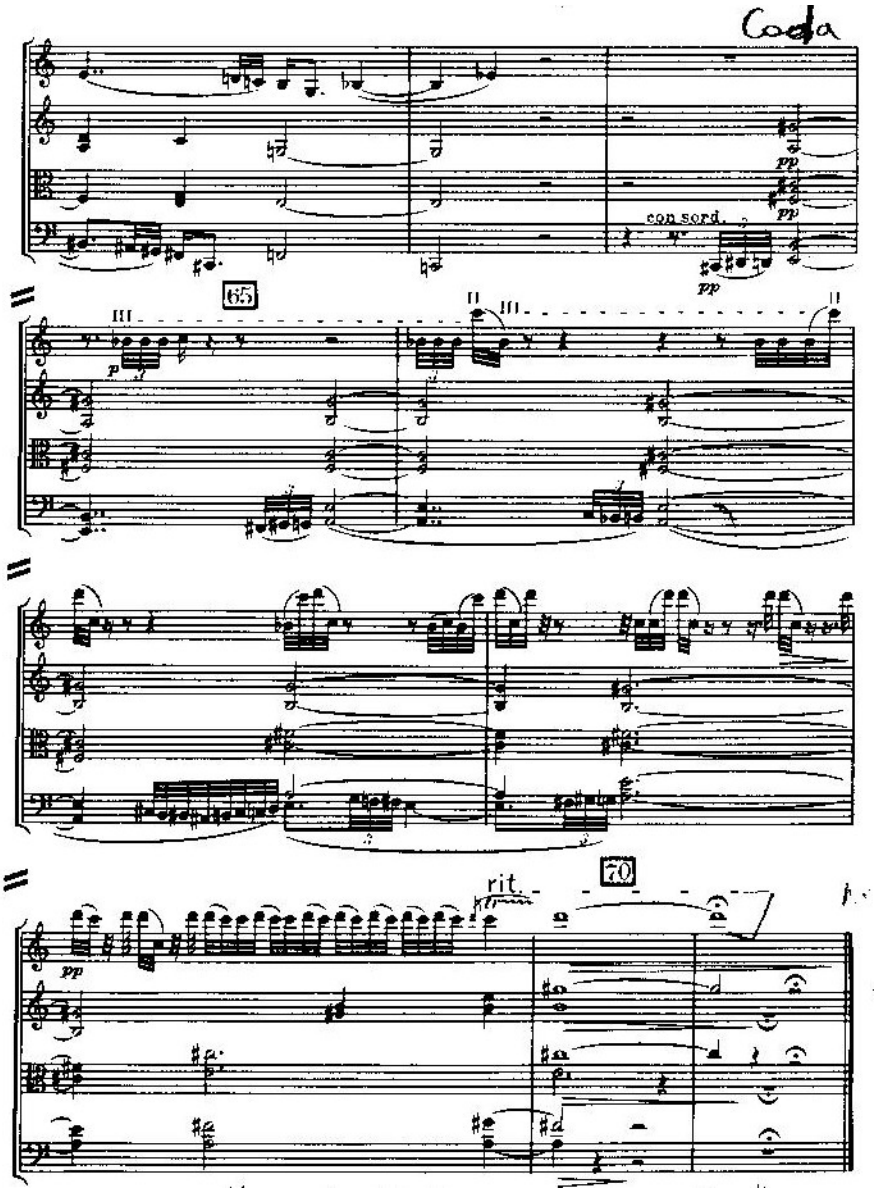



Figure 16: *Fourth String Quartet*, III, 62-end

Look at the 1st violin part. The entire coda is spent in showing that the Bb moves through the C to the D. This provides our Bb and the D of the scale. In the middle is the C that is a passing tone between the two scale members. The entire last five measures expands on the relation of the C to the D. First is the passing tone, then four

measures of lower neighbor trill between the C and the D, finally establishing beyond doubt the relationship between the D and the C that started in the first phrase of the cello melody in the beginning. The D# moves down to the D and then the C is included in the grouping as the relation of D.

The entire piece can then be seen as showing the connection that causes this stranger to our basic scale to be welcomed into the fold. D and C are united throughout this long explanation that incorporates many variations of the original scale. There are obvious relationships between the groups of notes of each section, beyond their simple transposition.

The third Movement is based on the collection based on C# that includes the D and the D#. By moving to the C in the Coda he prepares the melody of the fourth movement that is built on a collection that starts on C. This helps to demonstrate his understanding of these collections and the way that they can combine to form new collections, in the same way that they were formed from the modes.

As we discussed earlier, at the beginning of the fourth movement the pitch collection that had been formed from the circle of fifths and formed the harmonic context is modified and added to and now comes to the front as the melody. The viola and second violin parts that comprise the melody from measure 5 to measure 21 (Fibonacci numbers) are constructed from the same collection we found in the folk songs earlier.

C – Db – D – Eb – ^ - F – Gb – G – Ab - ^ - Bb - ^

1 1 1 2 1 1 1 2 2

Remember, the melody next moves into the mode that the composer discovered on one of his collecting tours. This closely resembles the Rumanian mode from the Banat district. Bartók said that it was used in aeolian mode with the following segment:

F – G – Ab – Bb – C – [D].[37] The cello plays in the pitch collection: C – D – E – F – G – Ab – Bb. This is turn can then be seen to be related to the melodies of the previous movement: D – Eb – F – G – Ab – Bb in measures 13-17.

From these two movements of the *Fourth String Quartet*, it has been shown that the composer is relating these melodies through their folk song roots and combination with the circle of fifths techniques to create a new scale that is shown to relate to other folk song styles. From the Hungarian to the circle of fifths and the Fibonacci Series he derives the folk song style of the Banat region. Here is a primer for the modification and transformation of folk songs and its marriage to the technical devices of the later compositions.

Next, there is a look at another later work, the *Music for String Instruments, Percussion and Celeste*. This work will be shown to be based on the Golden Section from its highest techtonic levels to the smallest motivic units. Fibonacci Series rhythms and the shapes of the individual movement are all determined by Golden Section proportions expressed in the Fibonacci Series.

[37] Belá Bartók, *Rumanian Folk Music* vol II, ed. By Benjamin Suchoff. (The Hague, Netherlands: Martinus Nijhoff, 1967), 17.

## ***MUSIC FOR STRINGS, PERCUSSION AND CELESTA***

Bartók wrote the *Music for Strings, Percussion and Celesta* with the Fibonacci Series and Golden Section in evidence. The Golden Section as a proportion of nature is not the product of modern geometry. It is an expression of proportion and symmetry. Attempts to find the exact proportions sometimes leads to problems. The proportion that governs the height to width of a maple leaf cannot be the subject of scientific precision. Neither will the attempt to put precise bar line numbers to larger works find true numeric values.

> Bartók's method, in his construction of form and harmony, is closely connected with the law of the GS. This is the formal element which is at least as significant in Bartók's music as the 2 + 2, 4 + 4, 8 + 8 bar periods or the overtone harmonization in the Viennese classical style.
>
> As an example, let us take the first movement of the Sonata for Two Pianos and Percussion. The movement comprises 443 bars, so its GS—following the above formula—is 443 x 0.618, i.e. 274, which indicates the center of gravity in the movement: the recapitulation starts precisely at the 274$^{th}$ bar.[38]

Lendvai's methods helps to show how the application of the G.S. to actual works eventually runs into problems. The entrances in *Music for Strings, Percussion and Celesta* have led to the notion that Bartók was counting barlines, not measures. This is true on some level, but ignores the way that the numbers would be counted if the entrances were on the bar line instead of on the eighth note before. If one adjusted for the early entrance, the measures fit perfectly.

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[38] Ernő Lendvai, Béla Bartók: an Analysis of his Music (London: Kahn and Averill, 1971), 17-18.

Look at measure one. The first phrase of the piece is the building block for the entire first movement. Notice that the measure is subdivided. The bar line is made less important than the takt by the subdivisions. The question becomes how important is the barline? Although it is evident that Bartók is using the measure or barline count to determine the entrances, what is the overall organizational factor? The second entrance occurs at the fifth barline or the beginning of the fifth measure. The third entrance is tardy, coming at the beginning of the ninth barline, when it should have been the eighth. The fourth entrance in the second violin is at the thirteenth measure as one would expect. Next there is an expansion of the idea of five note phrases that have generated the material. Two five eighth-note phrases are joined to produce the first 10/8 measure. This becomes an expansion in both directions. Upward we have the first measure with five takts (10/8) and downward to the 5/8 that has two. The melodic device becomes an alternative to our five note original phrase.

Each successive entrance of the original motive is on the opposite side of the original pitch. The first entrance is on A, the next moves up to the E, a fifth up from the original pitch. The third entrance is on D a fifth down from the original A. This forms an axis of symmetry around the A.

D#
G#
C#
F#
B
E
A
A
D
G
C
F
(Bb)
Eb

Interlocking x-cells occur at measure 38 through 50 continuing this one up one down movement. The entire movement evidences this type of expansion and then contraction. As one x-cell moves up while another moves in rolling motion or contrariwise. The original motive contained a set of five notes with four half steps. At 38 begins a new section that has figures that contain x-cells that contain three half steps. This in turn becomes mixed with the four half step motives. Next the violins begin a contrary motion at 47 that includes interlocking x-cells.

C# - D – D# - E  E – F – F# - G

This could be viewed as one large collection of half steps.

C# - D – D# - E – F – F# - G

Is this expansion or contraction, or both simultaneously?

A long descending figure in the contrabass follows hard on the last figure's heels at measure 52. This figure culminates at the climax at measure 56. The lower voices have moved downward and the upper voices moved upward creating a very broad texture.

Eb

A

---

A

Eb

This is also the Golden Section of the movement. The overall measure count is 89 (barlines) that yields a Golden Section of 55. The remainder of the movement witnesses an inverted version of the original five note phrase. The final seven measures include several new features. The normal and inverted phrases are alternated, until the

final phrase where they are juxtaposed in mirror fashion. He introduces another new element in the last seven measures. 11/8 seems to be a way of joining the 6/8 and 5/8 of the second part. And one should also observe that the last two measures are shortened by one eighth for the introductory eighth. This in 11/8 results in another Fibonacci number: 21.

Lendvai in his book on Bartók discusses the first movement of the *Music for Strings, Percussion and Celesta.*

> The 89 bars of the movement are divided into sections of 55 and 34 bars by the peak of this pyramid-like movement. From the point of view of colour and dynamic architecture the form sub-divides into further units: by the removal of the mute in the 34th bar and its use again in the 69th bar. The section leading up to the climax (b.55) shows a division of 34+21, and that from the climax onwards, 13+21. Thus the longer part comes first in the rising section, while in the falling section it is the shorter part that precedes the longer, so the section-points tend towards the climax. Positive and negative sections fit together like the rise and fall of a single wave (The 88 bars of the score must be completed by a whole-bar rest, in accordance with the Bülow analyses of Beethoven.)[39]

Movements as sections of the whole create Golden Section proportions. As Lendvai has shown us, the first movement is 89 bars long. The second movement is 520 measures. Together they form 609 measures. The entire work is 977 measures in length. The Golden Section of the entire piece is therefore a part of the formal outline.

977 * .618 = 603.786.

609-604 = 5.

5 / 977 = .0051177

[39] Ernő Lendvai, Béla Bartók: an Analysis of his Music (London: Kahn and Averill, 1971), 27-28.

In plain language, the Golden Section is off by one half of one percent. That used to be considered scientific accuracy. Science is more accurate today, but that is still too small to give change.

When the highest architectonic level of a piece can be demonstrated to be determined by Golden Section, then each formal section should be found to be determined by the G. S. as well. Lendvai shows us this in the quote about the first movement. Movement four is a very clear use of Golden Section and Fibonacci Series. Although the entire work is of the proportion, the Fibonacci numbers of the fourth movement make very clear how the composer was using the series in his compositional technique.

Eight is a natural part of the rhythm of Hungarian music. It is a predominant syllable count in Hungarian folk music and permeates rhythmic textures. It is very significant in the discussion of *Bluebeard's Castle* in a later chapter. This was written many years after the opera but many similarities can be seen. The eight syllable phrases of the melody of this fourth movement are a part of the Fibonacci Series and natural Hungarian rhythm. The first five measures begin the segments of eight rhythms.

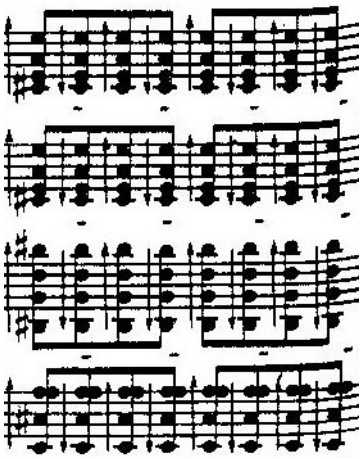

Figure 17: MSPC m.3

The steady eight pulse per two beat measure of 2/2 presages the melody. The irregular pulse of the melody also contains eight notes in a folk melody rhythm. It is highly syncopated but forms strings of eight beat patterns, as will be seen later in the opera. Here is the first of many patterns.

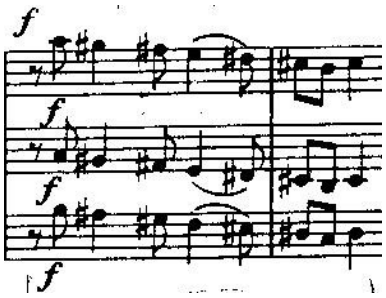


Figure 18: MSPC m.5

These patterns of eight that continue start at measure five. The first five measures have a triplet pattern through measure three and then the eighth note pattern from Figure 11 brings us to measure 5. Fibonacci is in clear evidence here 2 +3 = 5. The

melody that begins here at 5 continues with the eight patterns until measure 21 where a stretto figure interrupts it. The stretto again figures prominently in the form as was seen in the *Fourth String Quartet*. The eight pattern here has one 9 pattern, in the fashion that will later be seen in *Bluebeard's Castle*.

The other element from the opera and the quartet is the pitch collection that forms the melody. The melody is formed from the same symmetrical formation that we have been referring to as the "new chromaticism." The collection starts on C# in this case.

C# - D – D# - E – F# - G – G# - A – B

This collection has two x-cells that form a symmetrical pattern around the gap created by the missing F. C# - D – D# - E are combined with F# - G – G# - A. Bartók said that he had spread eight half steps over a diatonic plane. He did not specify where the gaps occurred that were created by the spread. In this fourth movement there are many complete collections just as there are in the opera and the folk song collections that we examined earlier. The next occurs in mm 27-35.

C# - D – D# - E – F# - G # - A – A# - B

This collection is very similar to the previous one but it is actually built on the G# instead of the C#. The gaps occur at F and G and C. More correctly it would be written from G#.

G # - A – A# - B - C# - D – D# - E – F#

This makes the collection symmetrical around C. The next collection that starts at 44 is related in a similar fashion to the first two. It again seems to begin on G#, but the gaps are again in different places.

D# - E – F – F# - G# - A – A# - B – C#

The collections are being transposed up by fifths, as occurs in tonal music. Next, one would expect the pattern to continue, but instead, the composer emphasizes the D# enharmonically spelled as Eb in the first and second violins at 62. This also fills in a potential new collection. Until 62 there was an incomplete collection that could have been the correct collection, but an expansive unison interrupts.

E – F – F# - G – A- Bb – B – C – C# - D

Not only is this one note too many, but then the Eb is added to make an almost complete 12 tone collection. The Eb continues to be emphasized in the manner of a pedal with unisons. Between these unisons, the melody is moved to the third violins that have an incomplete collection.

B – C – C# - D – E – F - _ - G – A – B

The cellos are in unison with the x-cell E – F – F# - G. When combined with the violins the complete collection occurs.

B – C – C# - D – E – F – F# - G – A – B

Moving by fifths, we would have expected the Bb. The fifths pattern is broken. The new collection creates a dissonance with the Eb pedal. This collection lacks the Eb. It is the first one in the movement that does not include the D# or Eb. The Eb pedal

becomes an Ab pedal while the other parts are made up of chromatic segments that lead to a new collection at B (74). The Ab is the enharmonic of the first note of the collection at 27. It is the "Dominant" collection and is naturally used as the pedal to anticipate the B section.

Here the expected collection occurs built on the D#. The composer has used a temporary modulation to emphasize his modulation to the new collection.

D# - E – F – F# - G# - A – A# - B – C#

This is proof that the composer is modulating through the relations of these "keys" of this "new chromaticism." By linking his collections in this way Bartók has removed any doubt about his use of the new collection as a distinct entity. This is now the true "mode" or "key".

**Conclusion**

To make a strong case, more than one proof should be offered. This first example has many loose connections that could be said to lead to other conclusions. There are more and better proofs. Let us look at one of Bartók's folk song collections published about the same time. It is a simplified texture that can help us dispel any doubts that what we saw in the previous example was not purposeful. Earlier in the paper, we examined the group of songs that were an example of the use of Golden Section in formal proportions. Now we will look at the melodic material in those pieces.

## FOURTH SET OF THE *TWENTY HUNGARIAN SONGS*

When Golden Section is a determining factor in the form, could it also be used to construct the melody? It took several times looking at these to find the pattern. There did appear to be strong relations between the song's pitch materials. In fact, two of the songs use the same pitch collection. In fact the melodic material of all the songs is related. Two inversions occur in two different songs. In a type of arch pattern the second and fourth songs are strongly related. The first, third and fifth are likewise related. The red herring here is the fact that the pitch collection in the first song is inverted. When one begins to look for the "new chromaticism" immediately there are problems. These are quickly explained by the new type of symmetry that the composer achieves through the characteristic division of the scale into half at the fifth that is inherent in the polymodality of the "new chromaticism". The two pitch collections are both created from symmetrical tetrachords – combined the two collections create the entire scale! The scales used in the *Twenty Hungarian Folk Songs* are very like the ones used in the *Eight Hungarian Folk Songs*. In each, the pitch collections that were used for the songs combine to form larger pitch collections. Bartók used inversions and other manipulations to disguise the similar pitch collections that were being used. He also used different key signatures to decrease the number of accidentals.

When one recognizes that the melodic material in the first song continually starts high and descends, then the inverted form is more easily perceived. Start at the top and count. Realize that again as in the previous example there is one lower neighbor that does not fit the pitch collection. In almost all cases that I have found, Bartók uses a lower neighbor to disguise the scale. If one analyzes the phrase structure of the song, it can be

seen that the first two measures of the melody are introductory. The pattern starting in measure 5 comprises the melodic material for the entire song. (Figure 20)

The other factor is that the normal form of the melody does not occur until the Fibonacci number 5, the 5th measure. How many songs in major or minor keys only use the basic pitch collection? Almost none occur that were written by good composers. Interest is created by using tonal answers as occurs here. The melodic pattern in the 4th measure becomes a pattern used in imitation throughout the song. The next measure, measure 5, has the pattern of two quarters, eighth then dotted quarter. It occurs in measures 8, 9, 13, 14, and 19. It is a powerful unifying element that is originally part of the harmonically unstable phrase using the lower neighbor to create a more interesting harmonic texture.

The main theme of the song is a true Fibonacci theme. It contains only the notes 0, 2, 3, 5, 8 and 12 in inversion. The next phrase is expanded and uses the full "new chromaticism" collection. Measures 8 – 14 use the pitch collection 0, 2, 3, 5, 7, 9, 10 and 12. Here as in the 3rd movement of the *Fourth String Quartet*, the lower neighbor is used, to throw an analyst off the track. This first song uses the foreign note, the B, the only one in the entire song. This gives us our entire "new chromaticism" collection. The next phrase uses the same collection. E is a pedal in the piano.

The entire melodic content of the song has been derived from the Golden Section and the Fibonacci sequence. The main phrase at 5 is comprised of the normal Fibonacci sequence numbers, then he expands these into the two phrases using the entire "new chromaticism" sequence.

Deutsche Übersetzung von R. St. Hoffmann

16

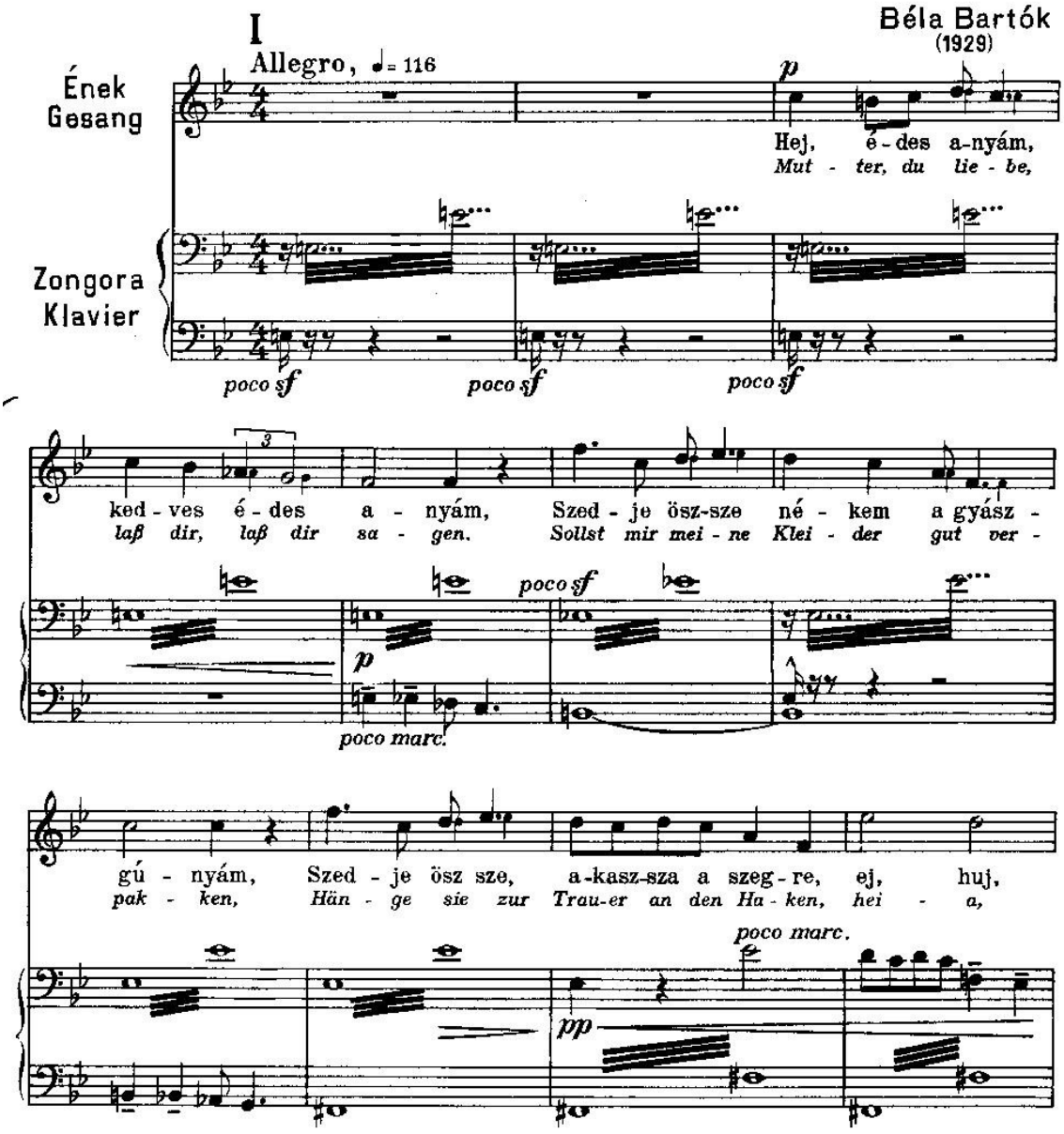


Figure 19: *Twenty Hungarian Songs*, IV - 16

It was strange at first to find this in a song collection based on the folk harmonies of the Hungarian people. Think on the quote from the first part of the paper.

> Through inversion, and by placing these [modal] chords in juxtaposition one above the other, many different chords are obtained and with them the freest melodic and harmonic treatment of the twelve tones of our present day harmonic system . . . Of course, many other (foreign) composers, who do not lean upon folk music, have met with similar results at about the same time – only in an intuitive or speculative way, which, evidently, is a procedure equally justifiable. The difference is that we created through Nature.[40]

Just what did he mean by "creating through Nature?" It has become clear that Bartók had found a way to use these natural proportions in form and also to build scales. As we see the entire harmonic texture of some of the pieces is derived from that created through Nature, the "new chromaticism".

Look at the second song of the group. Now Bartók uses the natural form of his scale. It begins on what we normally think of as the first scale step, C. Every note of the melody of this song is in the pitch collection of the "new chromaticism". There are no lower neighbors or other distractions used in this song. The pitch collection again is the familiar 0, 2, 3, 5, 7, 9, 10 and 12. The missing Ab is again used in the harmony. (Figure 21) This is the entire song. Notice that the missing Ab and Db occur during the last half of the song. One or the other is in each measure from measure 6. The final chord of the song is in measure 12, and includes the Ab and the Db. The chord in the last measure is the beginning of the next song. This is very similar to first song in that the missing 2nd, the E forms a kind of pedal tone, being repeated throughout the piece. (Figure 21)

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[40] Belá Bartók's *Essays,* ed. Benjamin Suchoff (New York: St. Martin's Press, 1976), 338

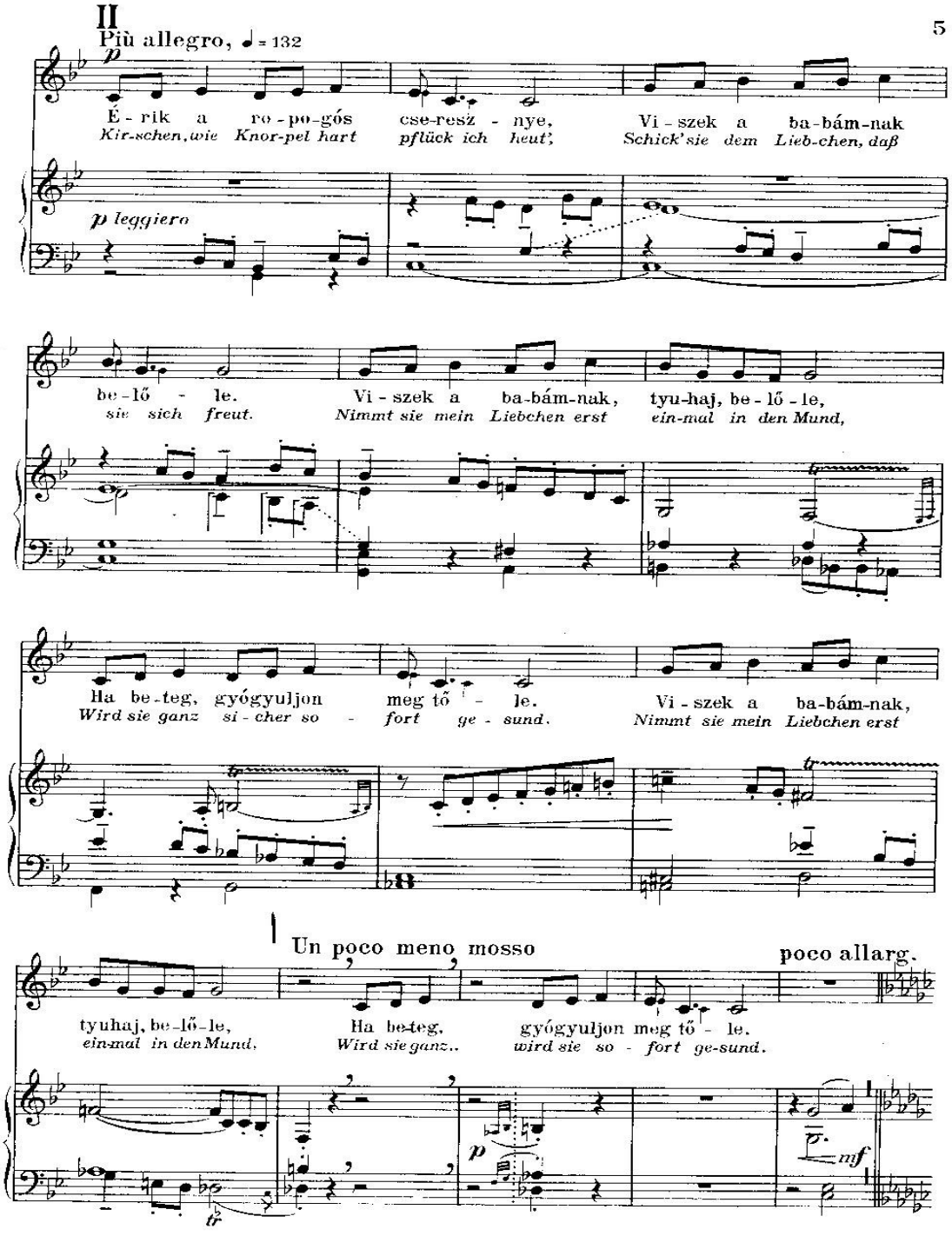


Figure 20: *Twenty Hungarian Folk Songs*, IV - 17

Perhaps it could be argued that this is not what he is doing. Could two songs be constructed from symmetrical tetrachords and not be related? Looking at the first song, the B natural neighbor could cause one to say that this is a mistake, but Bartók said that it contained at least eight half steps. He was not thinking about this collection. With the second song the proof is more strongly stated. Think for a minute that the pitch collections we are discussing have been manipulated in very sophisticated fashion. The first song uses the same pitch collection in inversion and transposed! Pitch 0 in the first song is the pitch 5 of the second song. This is not something that can just occur. The composer had to have a plan and be using his pitch collection in this fashion as an intellectual exercise. For example: here Bartók writes in the signature of two flats. This avoids the two missing scale degrees of E and B. This means he can use the diatonic pitch collection. The only other note he has to avoid is the F#. It is a beautifully deceptive method. It looks like he is writing in one of our usual scales. And it saves having to write out so many accidentals that would also make it more obvious what he is doing with his pitch collection.

Look for a moment at the fourth song. The same pitch collection is being used, until the (Fibonacci number) measure 8 from the number IV or 9 from the actual start of the song. E natural occurs in the melody at this point. The modulation to the new key for the next song has begun, so the composer creates instabilty in the pitch collection that is amplified by the harmonic texture of the piano.

More proof: returning to our ordered set, the next song, number three in the set, uses another transposition. The melodic material of the song is entirely made up of the collection 0, 1, (2) 3, 5, 7, 8, 10 and 12. This collection is missing some of the notes of the "new chromaticism". Where might one ask is the 2 and the 9? The 11 is also missing as usual, along with the 4 and the 6. It might occur to some to ask, what

about the church modes? Can't these all be explained by the church modes? First, one would have to get beyond the fact that these are not written in the manner of church modes with their dominant or reciting tones. Also, the church modes wouldn't be found in inversion. And, the composer would write the entire piece in the church mode instead of having the melody contain a different pitch collection. These are all evidence that it is instead the "new chromaticism".

The other four songs of this collection are made up of the collection:

0, 2, 3, 5, 7, 9, 10 and 12

(The last song is in inversion, and substitutes the 8 for the 9. This is discussed below.) This song on the other hand is made up of a mirrored collection. This song uses the other notes of the collection. These comprise the complementary collection:

0, 1, 3, 5, 7, 8, 10 and 12.

Look at the symmetries involved – around 11 and 6. Missing notes are in parenthesis.

| | | | | | |
|---|---|---|---|---|---|
| **(11)** | **0** | **(1)** | **2** | **3** | **(4)** |
| **(6)** | **7** | **(8)** | **9** | **10** | **(11)** |

The other form derives from the symmetry of 4 and 11. In each case two symmetrical tetrachords are created through the "new chromaticism". 0, 2, 3, 5 or 0,1,3,5.

| | | | | |
|---|---|---|---|---|
| **(4)** | **3** | **(2)** | **1** | **0** |
| **(11)** | **10** | **(9)** | **8** | **7** |

Is this a problem with the "new chromaticism" or is this the composer showing us the different forms that these can take? The two forms are exactly a perfect fifth apart, if one begins on 11 and moves up to 6 there is a difference of 7 half steps. The same can be said of the 4 up to 11. Symmetry at the fifth neatly divides the octave in two symmetrical tetrachords.

The final proof is in this third song, however. Look at the interlude in the piano beginning at measure 18 of the song that is also the Fibonacci number 55 of the entire collection. Here we find our missing notes. The C, E and G are here as he tells us that he knew he was leaving these out. (And they come at that important negative Golden Section point. The message might be that these notes are the antithesis of the main theme of the group of songs.) The last two notes are not here. These notes are only found in the last song that is in another transposition. The missing notes D and A, or 2 and 9, are the important notes – the key if you like of the last song in the cycle.

The last song's melody outlines the D to A then up to D arpeggio. Bartók is using those last notes that have been left out as indicated at the negative Golden Section point to create the melody for the positive Fibonacci point. The new pitch collection is based on the missing D. 0, 2, 3, 5, 7, 8, 10 and 12 in inversion. Notice that this is an expansion of the original inverted motive in the first song: 0, 2, 3, 5, 8. The main motive of the first song (as was previously discussed) uses the 8 and the 9. The 9 is used in the fashion of a lower neighbor rather than a chord tone. This joins the two forms together to show the connection between the primary Fibonacci Series and the extended

derived series. The full theme uses these pitches starting from the bottom to the top instead of the inverted form. Using the inverted and normal order in the same song is another way that the composer shows us that they are equal.

The melodic material in this last song is in many respects an exposition of the main tones of 0 and 9. This is the missing D and A from the third song. True, there are some scalar passages that run from the upper 0 to the lower 0. The overall scheme of the melody is to ornament the two key notes. This emphasizes the fact that these notes are the important features of the melody and has a second effect. It creates the feeling of tonality so that when one first looks at the song, the immediate thought would be to assume that it is a tonal piece. It would be appropriate to end in a strongly tonal fashion, giving a pleasingly complete feeling at the end of the group of 20 Hungarian Songs. However, it was apparent when I actually sat down to write a piece using these techniques, one could make it appear to be tonal. On the surface, one sees emphasis on a tonic and a dominant a perfect fifth above. And one could decide that the composer was using some kind of altered mode. One would be correct, but miss the point that the scale is not based on the old church modes created in imitation of the Greeks. It is an entirely new scale derived from the "new polymodality".

What have we learned from this song cycle? A number of very interesting things manifest about the possibilities for scale construction. Bartók has shown the extension of the Golden Section set of pitches. He has added to the basic set and created a new set of modes synthesized from the set of pitches using the overtone series of the Fibonacci numbers. This set includes 0, 1, 2, 3, 5, 7, 8, 9, 10 and 12. One mode can be created by leaving out the 1 and the 8. Another mode results from leaving out the 2 and the 9. Or, these could be interchanged using 1 and 9 or 2 and 8.

Basic Set

0, 1, 2, 3, 5, 7, 8, 9, 10, 12

Minor Mode

0, 1, 3, 5, 7, 9, 10, 12

Major Mode

0, 2, 3, 5, 7, 8, 10, 12

Mixed Mode

0, 2, 3, 5, 7, 9, 10, 12

0, 1, 3, 5, 7, 8, 10, 12

It is also possible to leave out the 10 and have an augmented 2nd jump to the octave. This is characteristic of some scales. Others that were not in evidence here include the pentatonic and whole tone scales. The pentatonic combinations are easy to see.

1, 3, 5, 7, 9

3, 5, 7, 10, 12

5, 7, 9, 12, 2

The many and various scale construction possibilities make identification of this type of scale construction difficult. On the other side, it creates great opportunities to mix types of scales without leaving the basic construction method. Pentatonic, octatonic (incomplete) and modal scales can be mixed freely. Also, x-cells, y-cells and z-cells can be created from the basic fabric of the scales. The mixture of these many elements creates a texture so varied that is can be very difficult to identify. One can correctly

classify it as pentatonic or octatonic or become convinced that it is a modal construction from the church modes or a folk sources. These can all be correct. This "new chromaticism" can be shaped into many varied forms and not alter its character.

How often is there a note that Bartók put in by mistake? How often did he miscalculate the numbers in his scale or decide to use a note because he liked the sound? Composers in tonal music have always used borrowed notes from other tonalities. Now, major chords are no longer a surprise at the end of a piece in minor. Did Bartók use similar borrowings in this music? How difficult would it be to identify the tonality then? If you could only say a piece was in a particular scale if it did not use any other notes, how many examples could we find? Pure examples of the scale would become very difficult to find. Proving what was going on when there is a modulation to a different scale would become a very large problem. Many controversies would develop – much as has happened with Bartók scholarship in the past. A few definitive examples might be the best one could hope for.

On the other hand, the system that Bartók created was as easy to use as "free" atonality. The difference was the tonal center that gave the added stability of a fundamental, but still allowing the free association of the pitches. The other advantage that makes it so difficult to clearly recognize is the alternation of our eight half step collection with other modes and pentatonic scales. How can we tell which is being used? The answer is that this is atonality. It is chromaticism based on modes, but it still is chromaticism. There is a fundamental, but the composer can choose how many notes he wants to use. Only when he limits the notes is there a clear relation to the modes that were the original mode mixtures.

## SECOND SET OF THE *TWENTY HUNGARIAN SONGS*

Take the first song of the second set of *Twenty Hungarian Songs* as a good example of using less than the entire collection of the "new chromaticism". The key of a short work or song is normally most securely stated at the beginning of the melody and here Bartók has made a clear statement of the "new chromaticism". Our familiar mixed mode is back in its simple form, allowing it to be identified. In normal forms the next most reliable occurrence of the tonic would come at the final statement of the melody. Here we find that the final statement of the last phrase of the original melody from measure 19 is again set in the basic set of the "new chromaticism" at measure 38. We can see then that the mixed mode of the "new chromaticism" is being used to give solid references for the form, in the same fashion as traditional tonality. Each of the four sets of songs shows us new ways to use the "new chromaticism".

The second song of the set is based on an ostinato pattern with tall pitch collections based on the familiar modes of the "new chromaticism." The third song is more interesting to us in that the mixed modes are much more in evidence. The "new chromaticism" dominates the song through measure 43 and then again from 55 through 62. This last segment includes the Golden Section of the piece. The last part of the piece sees the joining of the notes into all twelve tones, signifying completion.

This leads us into the last song of the group that follows the move to combining all the twelve tones into our mixture. This is done in a way as to not darken the texture, but instead the texture uses scurrying, running patterns to scatter all the notes in a shimmering texture.

**THIRD SET OF THE *TWENTY HUNGARIAN SONGS***

The third set of songs from the *Twenty Hungarian Folk Songs* continues this expanded use of number of scale members. It alternates the eight-note scale with the complete twelve-note collection. The first song is quite interesting in the way it combines the pitch collections. First, the open fifth begins the piece, as in the second song of the first set. There the similarity ends. The melody is two segments that is similar to the pentatonic and whole tone scales. It is a different construction that seems to be related to our combined modes. Whole step then a half, G – A – Bb. The other set it the same in a symmetrical construction. C – D – Eb, with G – A – Bb. The only collection that it fits is our "new chromaticism". C- C# - D - D# ^ F ^ G – G# - A – A# ^. It is symmetrical around the F. It turns up in many different places in the composer's music. It doesn't seem to fit interval cycles or Octatonic collections.

Whatever the source, it makes up the melody through measure 22. Until measure 13 all 12 tones form the accompaniment. Then in measures 13-23 the melody supplies the missing notes to fill in our special collection.

| | |
|---|---|
| Melody | Db G A |
| Piano | C - D - - Eb - ^ - F - ^ - - Ab - - Bb- ^ |
| Combined | C – D – Db – Eb - ^ - F - ^ - G – Ab – A – Bb - ^ |

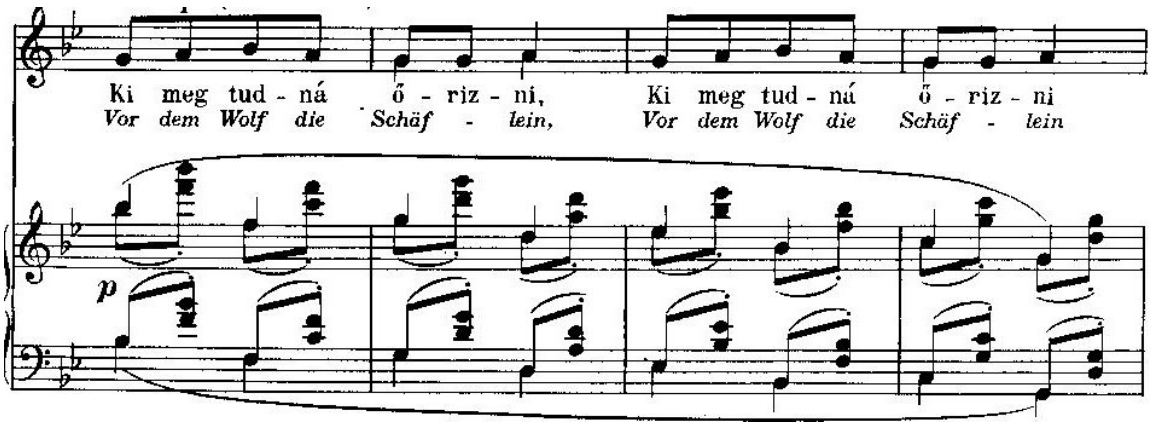


Figure 21: *Twenty Hungarian Songs*, III – 9 mm. 14-17

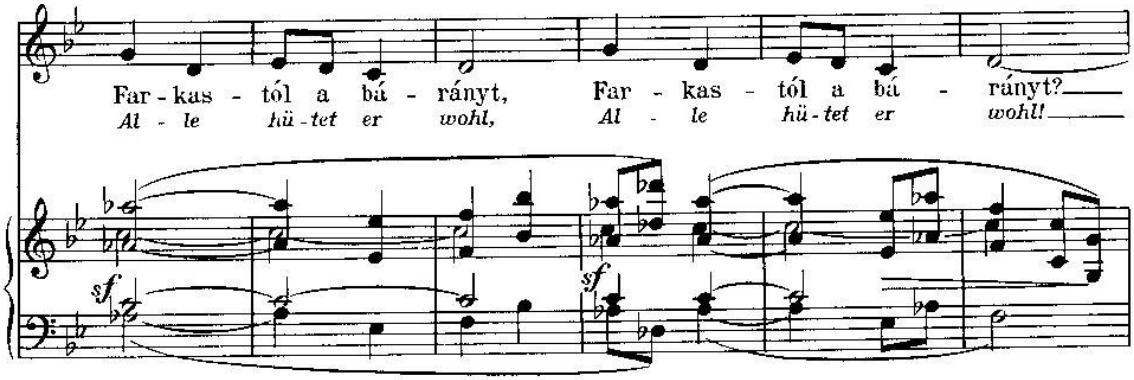


Figure 22: *Twenty Hungarian Songs,* III – 9 mm. 19-23

This song follows a pattern that is familiar with many repetitions. The Return or Recapitulation begins at the Golden Section point in highly chromatic style (m. 45). Then at measure 60 we have another restatement of the original theme in Tempo I. This final section is in the tonic key of our mixed mode collection. Bartók told us that this collection was based on the Lydian and Phrygian modes. Here our collection is complete and ends on the Phrygian fundamental. Writing up from the beginning notes of the modes:

E – F – F# - G - ^ - A - ^ - B – C – C# - D ^

1 1 1 2 2 1 1 1 2

This could be the actual original set that Bartók considered the basis for his "new chromaticism" that was based on his "new polymodality" created from the Phrygian and Lydian modes.

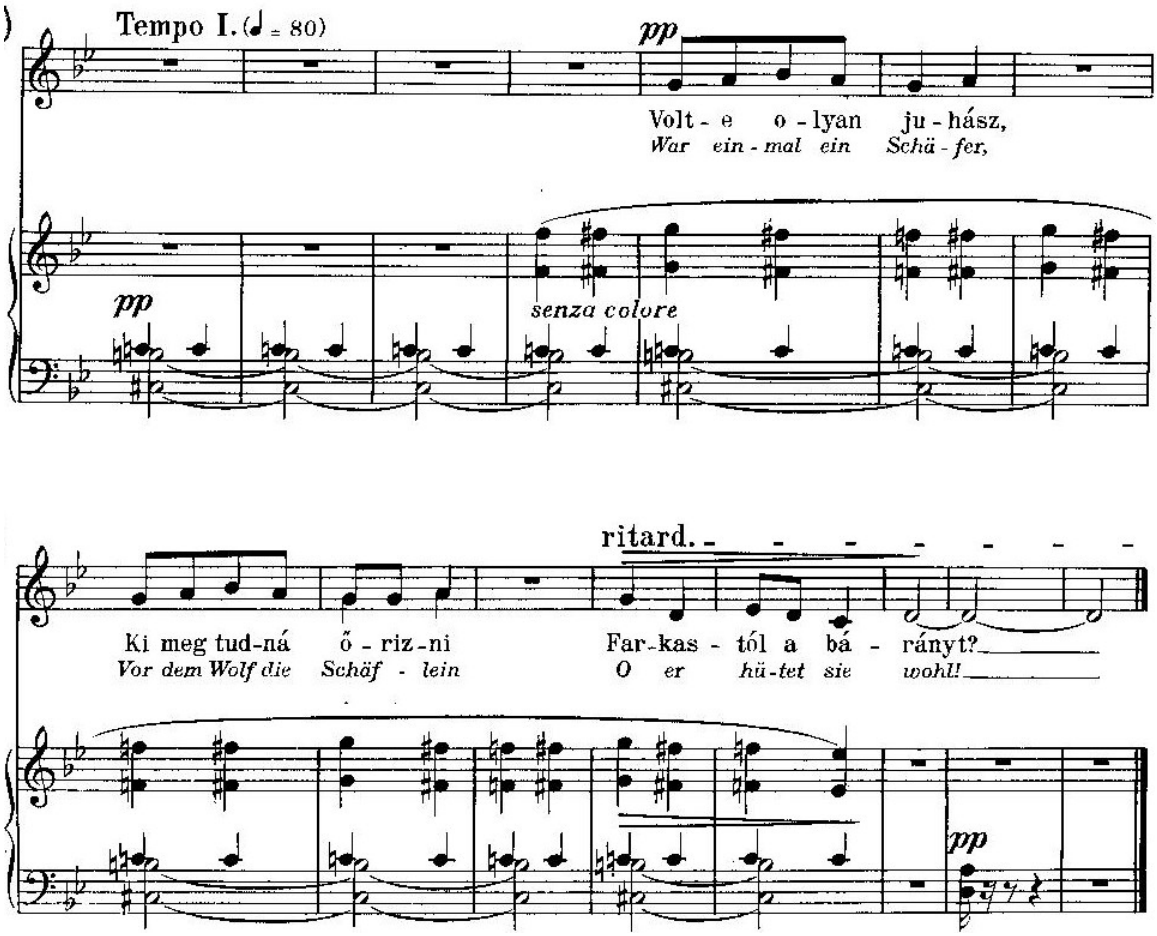


Figure 23: *Twenty Hungarian Songs*, III – 9 mm. 60 - end

Notice that the right hand of the piano is a chromatic step-wise motion from E to F and then chromatically stepwise upward. Then the left hand segment is three two half steps between three notes that with the melody, produce the entire collection. There is no other material present to confuse this analysis. It is one complete section. The earlier example built from fifths had one extra note that could give some room for argument. This is more clear-cut. With a static accompaniment, the basic texture is very apparent.

The next song, number 10 of the 20 songs is interesting in its use of Dorian melodies. There is an alteration of our basic textures. The "new chromaticism" that leads to the full 12-tone and is interrupted by interludes of simple modes.

Through measure 13 continues the "new chromaticism" from the previous song. Then the rest of the notes fill out the collection for 14-26. Measures 27-38 have a purely diatonic collection. Then a couple of additions lead to the "new chromaticism" from 39-47 before the modal section at 51 and a half. There is a G# that creeps in before the modal section that doesn't fit our collection, but it is in a transitional section. The song ends in a Dorian feeling, with sequential chromaticism marking the final return.

The next two songs continue this same alternation. Then the last songs of this third set form a type of climax for the entire cycle, becoming more frenetic and more chromatic. This leads into the fourth set of songs that we discussed previously. There are many ways to produce the same results. Bartók has demonstrated this to perfection in his 20 Hungarian Songs. It is a true "tour de force" of the "new chromaticism".

***EIGHT HUNGARIAN FOLK SONGS***

The next set of examples is from a much earlier work in the same style as the later folk song settings. The first five are from 1907. As might be expected, there are more notes from outside the collection to make it more tonal. The first three songs use similar material and in this case the entire fabric is forged from the "new chromaticism" The next two are more traditional folk styles. The other songs in the cycle use the later technique from 1917 of using the scale for the melodies, but use extended procedures for the other material.

Looking at the first song and bearing in mind what Bartók said in his lectures about the "new chromaticism," reinforces what he said. Here we find that same pitch collection as in the previous examples. The Eb would make the stacked half steps form.

C – C# - D – ^ – E – F – F# - G – ^ - A – ^ -B

(Eb)

A scale based on eight chromatic half steps. The statements of Bartók about combining the Lydian and Phrygian modes are shown to advantage here. The final cadence after the fermata at measure 13 is distinctly in the Phrygian mode. The final chord is changed to major – the only note that is outside our scale. How the many modes alluded to in the song combine to form the scale is a powerful argument in its favor. How could this pitch collection simply have happened? This shows its relationship to something more important than the simple combining of two modes. Why would he have used these two so often? Why not others?

Over and over the same pattern recurs, but the neoclassicism is exerting its influence. Where in the later set of songs the "new chromaticism" was a way of freeing his music from the shackles of tonality, here the reverse is true. Here compositional techniques are showing the way that the "new chromaticism" is used in tonal relationships in a modal texture. Modal melodies are still used to construct the scale of the "new chromaticism" while the accompaniment increasingly uses tonal progressions.

The second song follows our pattern except for those important chromatic transitions of tonal usage. Now the chromatic filling in of the chords causes the loss of the distinct outlines of the pitch collection. The added notes occur in non-chord type of situations, the Eb as a part of a turn figure and the Bb as part of a chromatic transition.

E – F –F# - G - ^ - A - ^ - B – C – C# - D - ^

Added pitches (Bb) (Eb)

Bartók maintained that his "modal chromaticism" was for melodies[41]. It was derived from folk modes and they in turn had nothing to do with harmonies. In this second song, there are added notes to create the transitions of tonal music, so there are two extra notes that give us 11 notes. Still over the eight half step rule, but the entire system is breaking down. The folk melodies are in the modes, mainly pentatonic, but tonality is returning in the accompaniment. They still maintain some modal character, helped by the presence of the overall modal structure of the "new chromaticism".

The third song is a picture of the transition that is occurring with the neo-Classical movement of this time. The first part of the song until the Golden Section is dominated with the "new chromaticism".

[41] Béla Bartók: *Essays,* ed. by Benjamin Suchoff (New York: St. Martin's Press, 1976) 376.

C – Db – ^ - Eb – Fb – F – Gb - ^ - Ab – ^ - Bb - Cb

1 2 1 1 1 2 2 1 1

There is a change into sharps in the middle that has an incomplete pitch collection for four measures, then the original pitch collection returns. The song ends in the pure minor mode on repeated seventh chords that remind us that this isn't actual classicism. It is instead a post-Romantic Era idea of classicism. The modal melody still portrays the folk character of the piece.

These simple melodies fit easily and comfortably in the new scale. If one compares the last song of the *Twenty Hungarian Folk Songs* to the last five songs of the *Eight Hungarian Songs* collection there is marked similarity. The pitch collection and the shape of the melodies are very similar. There could be an inclination to ascribe this to the folk character of the music. One would have to say that there is evidence to support this inherent in settings of melodies from the folk idiom. One should notice that when the pitch classes of the last 5 songs are examined, two songs use the same pitches, and one is very similar to those two.

The other two are very different. When combined, the pitch classes of the last three songs yield the full set of 12 pitch classes. At the same time, the pitch class systems of all five songs can be explained by the "new chromaticism".

IV – VIII

IV

D E G A B

V

D E G A B

VI

C C# D E F# G A B

"new chromaticism" minus the G#

VII

C Db Eb F Ab Bb

VIII

C D E F G A

Combined

C C# D D# E F F# G G# A A# B

The enharmonic sharps have been substituted for the flats.

The composer is showing us that the various versions combine to form all 12 tones.

Let's take a closer look at the first three songs. The way the composer is manipulating the pitches becomes evident when they are examined. The first song and the second song use the same collection. The third song uses a transposed form of this collection. Here is the collection in its normal order:

Eb---------- Eb
\ /
E - F - F# - G - ^ - A - ^ - B - C - C# - D
1 1 1 2 2 1 1 1

This is the transposed order.

Eb - Fb - F - Gb - ^ - Ab - ^ - Bb - Cb - C – Db - ^

There is an Eb in the first song that can only be explained as neighbor to the D, and is outside of the modal harmony. However, it is symmetrical to the bimodal chromatic symmetry shown here. The only other note outside of the bimodal symmetry is the cadential G#. At the end of each song there is a transition to the key of the next song. The first song has the foreign G# in the last chord. Like the Piccardy Third, the G# occurs at the cadence. When the Eb is taken out then it is much easier to recognize the basic polymodal collection that is being used.

The second song has Eb and Bb in the last phrase that prepares the transposed version of the scale used in the third song that uses flats instead of sharps. The third song anticipates the end and reintroduces the sharps that fit in with the pentatonic melody of the next song. This three-part song uses only the "new chromaticism" the first and last parts. The middle part uses different harmonization, but maintains the "new chromaticism" in the entire melody. Song cycles in tonal music normally have a transition at the end or beginning of the next song to modulate to the new key.

Think about the eight songs as a group. Is there an internal scheme of the eight songs? First, we looked at the forms of the songs earlier in the paper. Now, can we draw further conclusions about the relation of the overall collection and the Golden Section and the Fibonacci Series? The first three songs are totally comprised of the pitches from the possibly Golden Section derived "new chromaticism". The next two

songs are pentatonic. That is one of the many pitch systems possible in the "new chromaticism". Bartók stated in his lectures that he alternated pentatonic with the "new chromaticism". The last three are like the first three, derived from the "new chromaticism". One is a type of whole tone and the other two are partial collections that resemble the church modes. So we find that there are three songs related by scale, then two songs of a similar pentatonic nature. Then three songs that "complement" each other by using pitches that together form all 12 possible tones. The composer is taking us on a tour of the possibilities. This also follows the Golden Section in the fact that 5 is the Golden Section of 8. The "negative" or "mirrored" set of the Golden Section would be 3. This is a form that comes from three sections. 3 + 2 + 3, a beautiful symmetrical division according to the Golden Section.

He is exploring through these simple songs and melodies the many possible pitch systems available through the "new chromaticism". Formal considerations, harmonic material and melodic material are all parts of a harmonious whole entirely based on this procedure as natural as a leaf and as beautifully constructed and complex as the Parthenon in Greece. These songs were written in the time immediately following the writing of *Bluebeard's Castle*, (1911). They should have many similarities to the writing in the opera. In the later songs we had looked at, the accompaniments were much less diatonic. These earlier songs had sections of traditional modal writing in between the more advanced styles. One would anticipate the same being true when we look at the opera. In fact the opera begins with what appears to be a unison pentatonic scale.

# Chapter Four

## Bartók's *Bluebeard's Castle*

### INTRODUCTION

Although *Bluebeard's Castle* is an early work, the procedures and techniques of Bartók's later style could already be detected. In fact, it is surprising that such a serious work in a mature style should come from such a young composer. The youth and vigor of Bartók and the librettist Balázs are evident in the score. In fact, it was youthful idealism that led Bartók and Balázs to find the nationalistic themes in *Bluebeard*. Bartók had been surprised to find that Claude Debussy (1862-1918) used many of the pentatonic and various modal constructions that Bartók had found in his studies of Hungarian folk music. The whole tone and pentatonic structures were a feature of these melodies. In Debussy's opera *Pelléas et Mélisande (1902)*, Bartók found the inspiration for a new style of opera, referred to as recitative or parlando-rubato.

Bartók wanted to free the text from the gymnastic vocal qualities of traditional opera. To do this Bartók used a text set in traditional Hungarian 8 syllable lines. By staying faithful to the ancient traditions, Bartók hoped to create a new form of expression that was uniquely Hungarian. To set these texts, Bartók turned to the folk songs and the "new chromaticism" for melodic content mixed with the harmonic idiom of Debussy and the Russians. Bartók furthered the move away from traditional tonalities through its use of the pentatonic scale and the modes of traditional folk music and the use of modal combinations in his original compostitions. He was not trying to abandon tonality, but to expand it. The opera was written at the same time as the first set of folk songs that we examined. The "new chromaticism" is a method of developing new tonal collections,

expanding the old tonal language to include natural and folk elements. The new scale tends to fit very easily into a system where all 12 tones are used. As we discovered before, Bartók said that his "new chromaticism" alternated pentatonic with his own melodies that contained at least eight half steps.

> He asserted that, in order to create something new, one must go back to the old. This conclusion was the result of his experience with ancient Hungarian and other East-European folk music, which helped emancipate him from the hegemony of the major-minor system by giving him the pentatonic and modal scales with which to generate new harmonies. This emancipation, then led to the free disposition of all twelve tones of the octave. But folk music gave him much more than this. It gave him much more than just new possibilities for melodic, harmonic, tonal and rhythmic structure; it gave him the principle of the Golden Section, it made him think in dialectic terms and consequently, it also made it possible for him to fuse Eastern and Western music into one, all embracing inimitable style.[42]

Bartók used many elements to give shape and form to his music. The formal aspects were not only those of tradition but also those of nature. The Golden Mean as it is referred to in some sources, or the more common term Golden Section has been important to works of art since classical times. They helped shape the Pyramids and the Parthenon.

Lendvai and others have written extensively about Bartók's use of the G.S. as a means of giving form and shape to many of his works. A naturally pleasing proportion is the result of the use of the Golden Section.

> Golden Section means the division of a distance in such a way that the proportion of the whole length to the larger part corresponds geometrically to the proportion of the larger to the smaller part, i. e. The larger part is the geometric

[42] Szentkirályi, András. "Some Aspects of Belá Bartók's Compositional Techniques," Studia Musicologica vol 20 (1978) 157-182.

> mean of the whole length and the smaller part. A simple calculation shows that if the whole length is taken as unity, the value of the larger section is 0.618 . . .
>
> $$I: x = x: (1 - x)$$
>
> And hence the smaller part is 0.382 . . . Thus, the larger part of any length divided into GS is equal to the whole length multiplied by 0.618.[43]

Lendvai goes on to discuss the examples in Bartók of the first movement of the Sonata for Two Pianos and Percussion and movement I of the Divertimento as well as several others.

[43] Ernő Lendvai, Béla Bartók: an Analysis of his Music (London: Kahn and Averill, 1971), 17.

**GOLDEN SECTION IN *BLUEBEARD'S CASTLE*.**

In the opera, *Bluebeard's Castle*, Bartók does not observe the Golden Section as major divisions of the musical form. Instead, Bartók uses the G.S. points as important turning points in the drama. During the first part of the opera, up to the first, smaller or negative[44] G.S. (as Lendvai refers to it), Judith is discovering the castle. In this she is discovering Bluebeard himself and coming to admit that she loves him and first asks him to open all the doors. This occurs between measures 532 and 534. A firmata puntuates the end of the statement in measure 534. (Figure 24) At this first, less important climax, she tells him that she is his and she loves him. The fly in the ointment, or maybe it would be better to say spider in the blood, is that Judith insists that he open all the doors. Any woman who sees inside all the doors must join the wives imprisoned in the last one. Bluebeard counters with a long aria to convince her that some of the doors should remain closed. He says he will give her three keys to go with the first two doors that he has already opened.

[44] Ernő Lendvai, Béla Bartók: an Analysis of his Music (London: Kahn and Averill, 1971) 28.

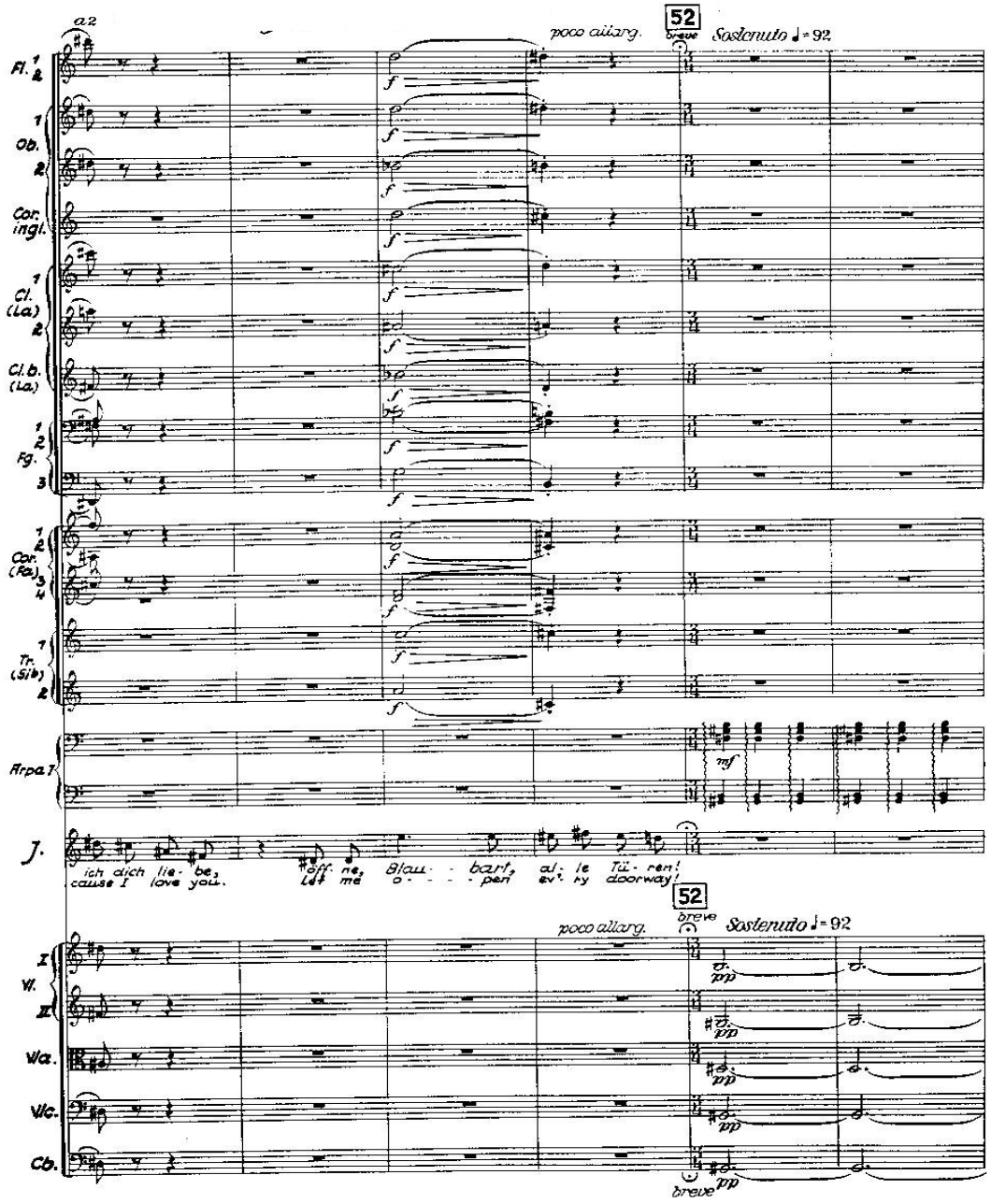


Figure 24: *Bluebeard's Castle*, mm. 531-536, includes negative Golden Section point at Fermata.

**Door numbers, syllabic sequences and harmonic constructions.**

Is it a coincidence that these two numbers are at the beginning of the Fibonacci Series? Two doors plus three doors equals five doors. The other important G.S. is during the fifth door scene. Lendvai explains the series.

> The proportion of 3:5:8:13 contains a GS Sequence, approximately expressed in natural numbers: the Fibonacci numbers. A characteristic feature of this sequence is that every member is equal to the sum of the two preceding members: 2, 3, 5, 8, 13, 21, 34, 55, 89. . . and further, it approximates more and more to the irrational key – number of the GS* (the GS of 55 is 34, and that of 89 is 55).[45]

The importance of 5 and 8 will be seen later. At this point, is should be mentioned that the opera has 8 sections, the Prologue, 7 doors and return of the Prologue with the same music. Hence, 5 and 8 are essential divisions in the overall operatic form. They become much more important in the fifth door scene. Here in the passage after the canon, there is an emphasis of 2 and 3. The Canon between voice and orchestra ( that foreshadows the first section of the first movement in the fourth string quartet) begins in 4/4 and 3/4, but the remainder of the scene leading up to the next door is entirely in alternating 2/4 and 3/4.

These 2 and 3 based passages take on a character of the voice that is active. When Judith speaks, the meter is 2/4. When Bluebeard speaks, the meter is ¾. This gives heightened meaning to the G.S. and the interaction of the Fibonacci Series. Also the scale for Bluebeard is pentatonic while Judith always sings in the new scale. The pentatonic scale of Bluebeard is based in the 3, 5 and 8 of the Fibonacci.[46] The whole tone tetrachords of Judith's lines are made up of 8 half steps symmetrically divided

[45]Ernő Lendvai, Béla Bartók: an Analysis of his Music (London: Kahn and Averill, 1971), 27
[46] The interpretation in terms of pitch relations is Lendvai's, and controversial among various theorists.

into 2's, another Fibonacci number, if we acknowledge Lendvai's associations of the principle on this level.

Here at the beginning of the negative G.S. we find a strong indication of Fibonacci Series in the pentatonic structure of the melody. Szentkirályi went on to discuss the relation of the G.S. to the pentatonic scale. The series of 3, 5 and 8 form the primary tetrachord of the pentatonic. (Figure 25)

> That the Golden Section is not an arbitrary concept but one of the most fundamental principles of music, is supported by the structure of the pentatonic scale which can be considered the simplest manifestation of the Golden Section:

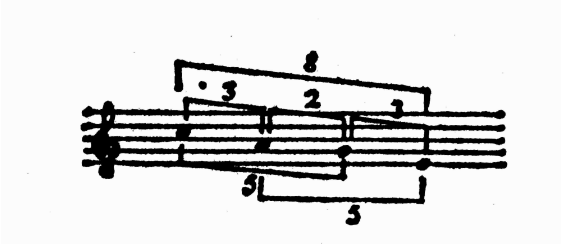


Figure 25

> The numbers refer to semitones[47], a practice taken from twelve-tone theory.[48]

Bluebeard's first aria occurs at measure 514 just before the negative G.S. point. This first extended singing of Bluebeard is the recurring soothing, pleading music where he is attempting to convince her to be satisfied with the first five doors. The Canon between the voice and orchestra is based on this pentatonic melody, so the elements combine here. The Pentatonic, Golden Section, Fibonacci Series and the ancient traditional forms of counterpoint are joined in a fashion that will later be more completely worked out in the Fourth String Quartet. One might also point out that the

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[47] This interpretation through twelve-tone theory is here being applied to a work written before the development of those theories.

[48] Szentkirályi, András. "Some Aspects of Belá Bartók's Compositional Techniques," Studia Musicologica vol. 20 (1978): 158.

intervals are constructed from the "new chromaticism," mm. 514 - 519 use only the form of the "new chromaticism" that begins on B instead of C, the 11th degree form. Measures 520 – 528 use the same pitch collection with one extra note, the Bb. Judith and the 2/4 return at that point. The Bb should be seen as a kind of common tone with the new Judith tonality. It anticipates her entry, beginning the transition. Judith's tonality uses all 12 tones, by adding more notes to the "new chromaticism".

This combination of elements will be very helpful when the fifth door is examined next. The apparent coincidence of these coming together will make the next discussion more reasonable, when one begins to work out the elegant craftsmanship that went into the compositional process. It is astounding to see how controlled and tightly bound all the musical elements are at first. The fifth door scene starts at m. 763.

**Golden Section and dramatic climax**

The actual G.S. point is just before No. 81. Again the G.S. turns on the dramatic action and not traditional musical form. Bluebeard is again attempting to persuade Judith to stay content to just love him. He asks her to kiss him. She demands to open the door. By conceding to her demands, Bluebeard seals her fate.

Although these numbers are not exact, they relate to overall patterns and Antokoletz shows the more precise rhythmic pattern in his amazing new book[49] on the opera[50]. In the same way that a piece can be in Sonata form and still observe the proportions of the Golden Section, these overall patterns in the speech of Judith and Bluebeard are significant, although the patterns have interruptions. There are few

[49] Having heard his lectures on Debussy, I had been one of the voices encouraging him to publish them. His combination of analysis and knowledge of music history is unmatched.
[50] Elliott Antokoletz: *Musical Symbolism in the Operas of Debussy and Bartók (*New York, Oxford University Press, 2004) pg. 237.

musical pieces that keep a rhythmic pulse through the entire piece. They can still be said to be in that overall pattern but with interruptions. During this scene we also find a connection between the speaker and the particular Fibonacci number that relates to their character. 5 has a softer more feminine ending than the square shouldered 8. So it is no surprise that we find the 5's when Judith is singing and the 8's when it is Bluebeard. The section starts with the 5 – 5 measures of response to Judith's "Ah". The 5 measures contain two repetitions of 8 notes. The melody is in pentatonic, while the harmony is a form of diatonic parallelism. So, the elements are mixed. Judith sings – the melody is in Bluebeard's style, but the harmony is human, like Judith. While inside her overall 5 measure form, the 8 of Bluebeard has a life of its own.

A held chord has no part in the time progression. The chord before no. 75 has a fermata that indicates it as outside the rhythm. The voice enters with 3 repetitions of 8 inside the overall shape of the 8 measures. Then again we see that Judith's line is outside of the rhythm, perhaps a picture of the fact that Judith is not yet a part of this spectacle and shocked by it. Then, at no. 76 there is the five measure pattern that opened the scene. The next occurrence is an 8 measure grouping while Bluebeard sings 3 8-syllable lines. This pattern continues until no. 80.

**Stefi Geyer or Funeral Theme?**

At this point the melody is the motive that Bartók had identified in his letter to Stefi Geyer as his funeral theme. We usually identify it as the Stefi motive. (Figure 26)

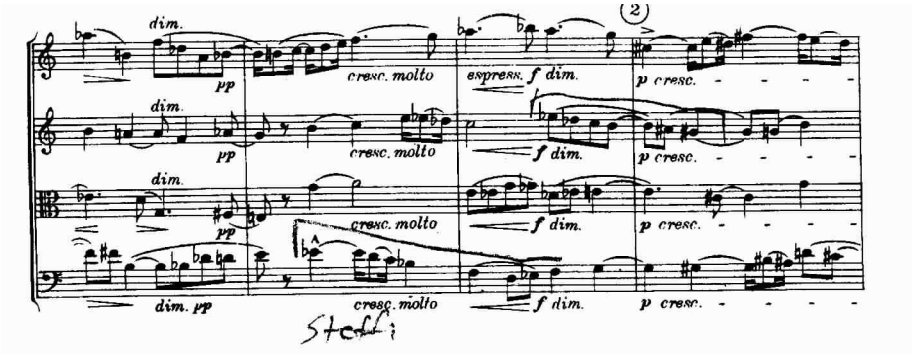


Figure 26: *First String Quartet*, I mm. 10-13

Here it is at m. 12 to 13 of the 1st String Quartet.[51] Now let's compare it to no. 80 of the opera. Here it is in a pentatonic and whole tone idiom, so it has changed to allow the necessary permutations. (Figure 27)

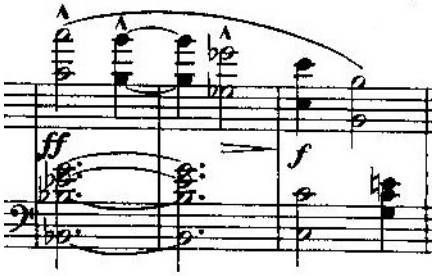


Figure 27: *Bluebeard's Castle* No. 80 m. 1-3.

Notice that the pitch collection can be reordered. There is a Fibonacci number hidden here from the G.S. The Bachmans showed the permutations of the G.S. based harmony that we saw earlier. The statements of the Bachmans are not completely correct but should be part of the discussion. (Figure 28) The previous discussions of the "new

[51] Bartók, Béla. The String Quartets of Bartók, Béla (New York: Boosey & Hawkes, 1945), 23.

chromaticism" show that the way the composer used the G.S. to create the harmony was very different than what the Bachmans propose. The inversion of the theme is more plausible.

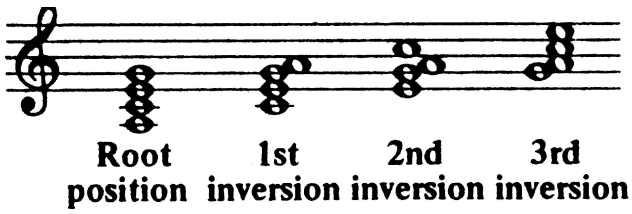


Figure 28: Bachmann's illustration.[52]

Here the Bachmanns show the inversions of the G.S. chord that can also directly connect the Stefi theme to the Judith theme through a shared tonality. (Figure 29)

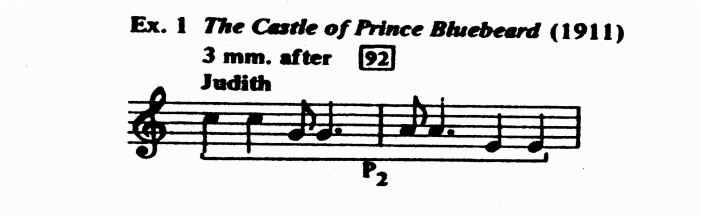


Figure 29: Bachmann's illustration.

This is the motive that is associated with Judith throughout the opera and thereby shows the influence of G.S. on the music. Later, we will see how the G.S may have helped to determine all of the vocal melodies and some instrumental.

[52] Bachmann, Peter J. And Tibor. "An Analysis of Béla Bartók's Music through Fibonaccian Numbers and The Golden Mean" Musical Quarterly vol. 65, no. 1 (February 1979): 72-82.

**Locus on the 8's**

This new section that began at 80, is entirely controlled by 5's. Count up the various notes in the first three measures at 80. There are 5 pitches in the upper line, the violins and clarinets and others. The vocal lines of Bluebeard and Judith appear to be controlled by 8's. By the end of the section, we start to see this work consistently, although some of the measures that follow actually have 9 or 7 counting this way. At 83, the eights are taken by the accompaniment showing the dominance of Judith who fails to be persuaded.

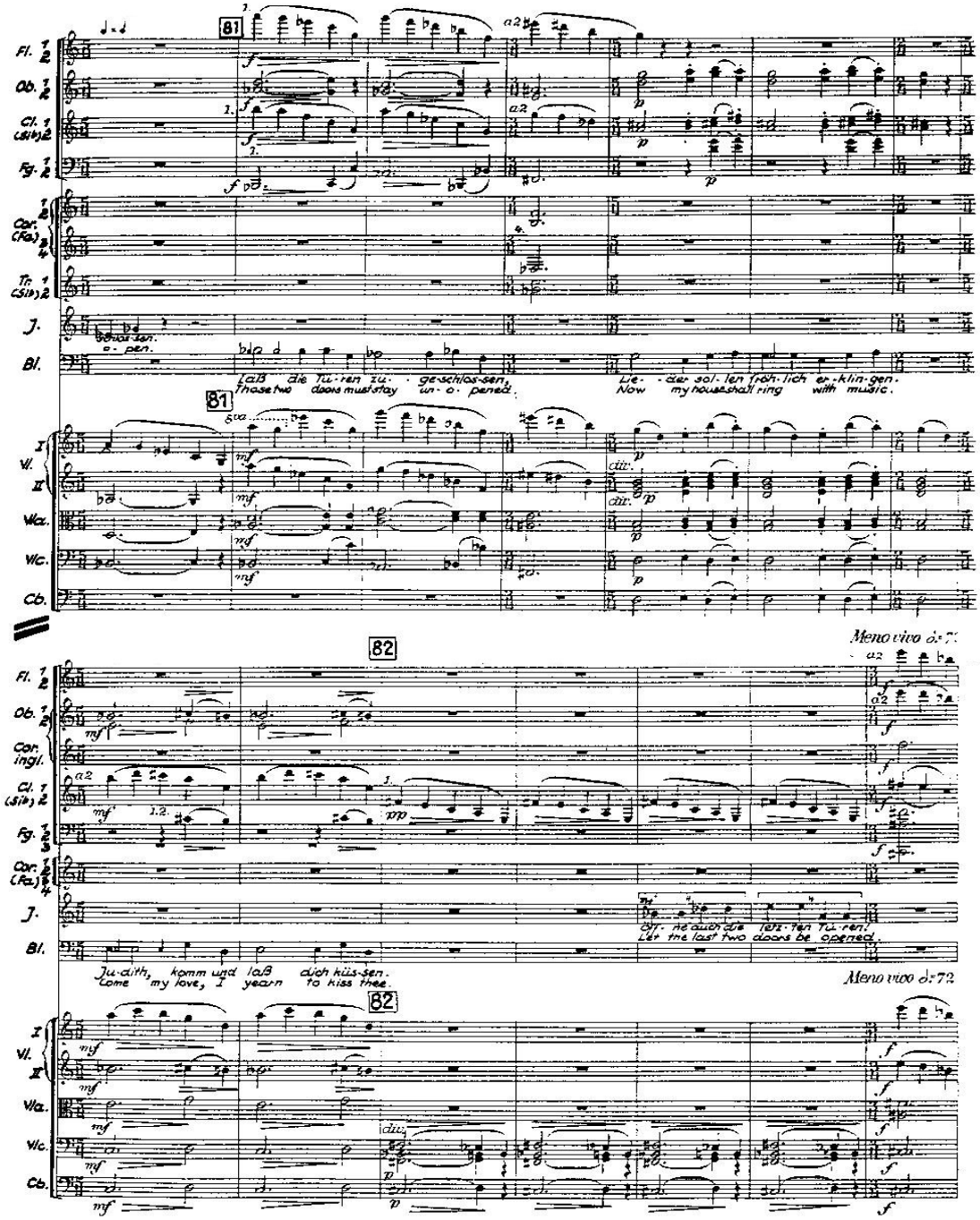


Figure 30: *Bluebeard's Castle* mm. 840-853.

This could be a weakness in the explanation. Bartók shows that this is on his mind at the end of the section. The fragments of the Stefi theme begin to repeat at no 85. Much the same way that Mozart or Haydn would repeat their cadential patterns; here the composer uses repetition to build to a final statement. Here it has an added numerical significance in that the 5 patterns of Judith that have been integrated into the 8's of this section will be joined with the 8 of Bluebeard to show completion by becoming 13, the next Fibonacci number. (Figure 30) (Figure 31) In figure 30 the first two notes are actually the last of the 13.

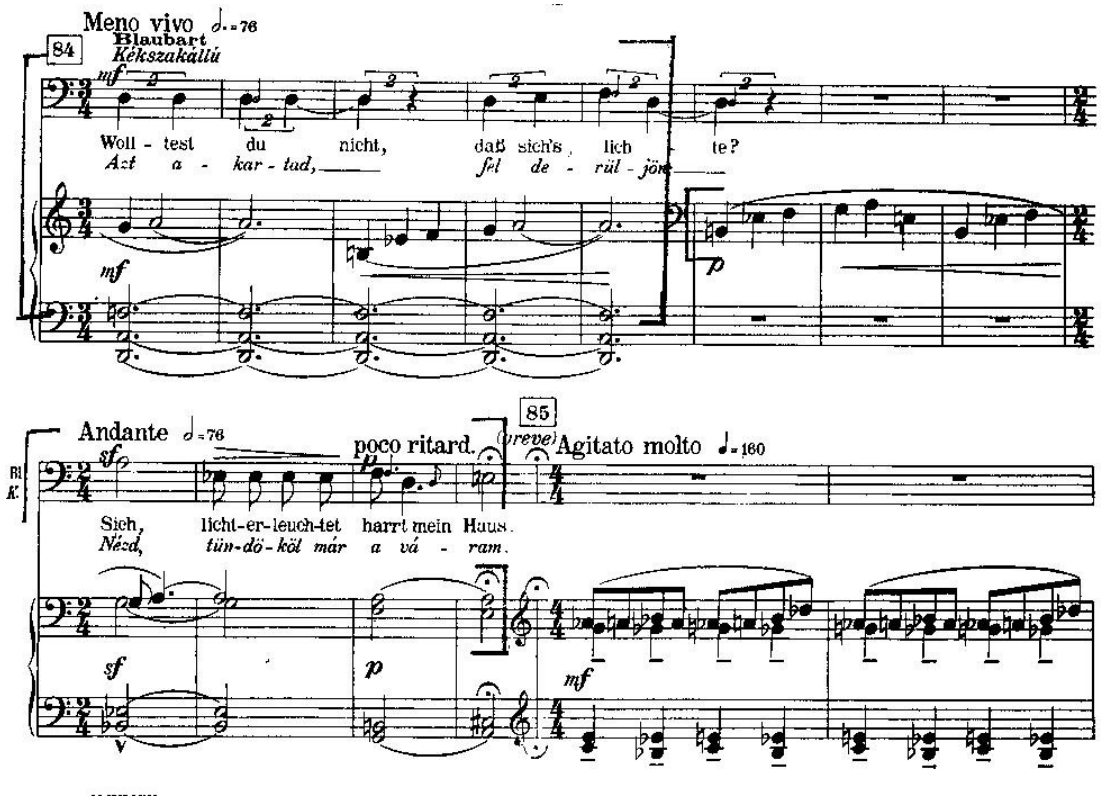


Figure 31: *Bluebeard's Castle*: No. 84-85

The eights of Judith in the last phrase, shown in Figure 31 are added to the 5 that previously represented her to create the 13 that is shown in the orchestra. The Bluebeard at No. 84 has 8 then the orchestra accompanies with 5. These join to form thirteen that ends at the fermata at 85.

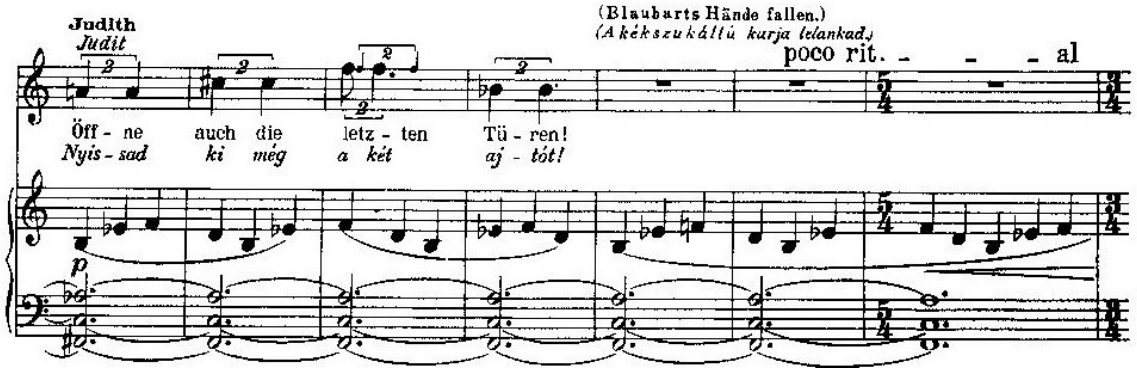


Figure 32: *Bluebeard's Castle:* 7 measures that lead to No. 84.

The 5 and 8 are joined to form the 13 that represents their union. Notice that the whole tone and pentatonic are joined along with the 8 of Bluebeard and the 5 of Judith.

Antokoletz and Carl Leafstedt[53] agree that this is the start of the new section as you can see by Antokoletz marking of the new section as B at 85. In this new section the 8 is uninterrupted. Here, just as in the vocal melodies, the 8 does not include the harmony. This occurs in several permutations. (Figure 33) (Figure 34)

[53] Leafstedt, Carl. "Structure in the Fifth Door Scene of Bartók's Duke Bluebeard's Castle – An Alternative Viewpoint" College Music Symposium vol. 30 no. 1 (Spring 1990): 96-102.

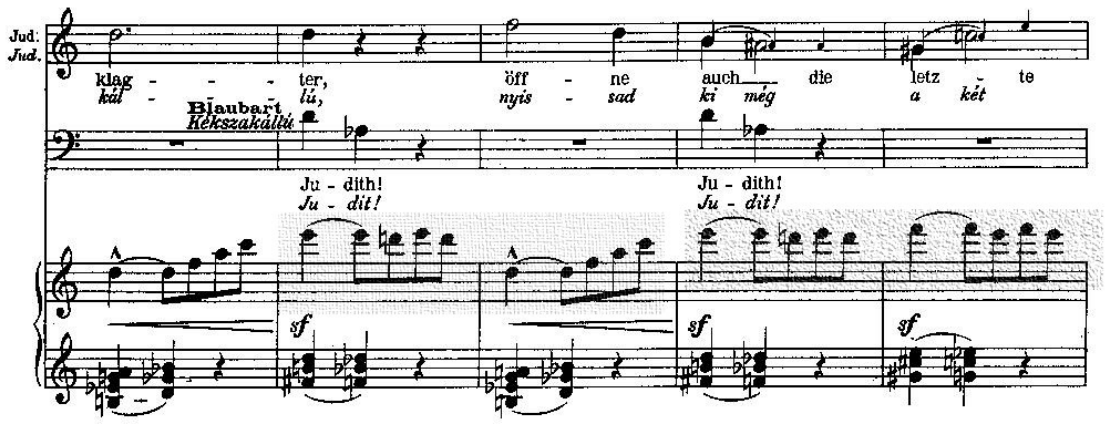


Figure 33: *Bluebeard's Castle* seven before number 88

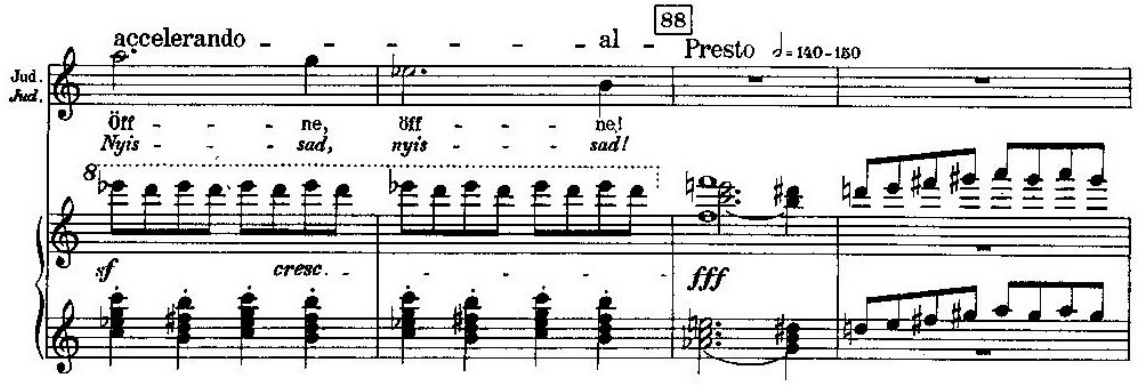


Figure 34: *Bluebeard's Castle*

At 88, the transition to the end of the section begins, when the series of 8's are interrupted by chords. These chords are there to show us the connection between the Fibonacci based Stefi chord that moves to the whole tone chord on the Fourth beat. Once more the composer hints that this is combining the 5's in the new scale with the 8's in pentatony of Bluebeard. At 88, there are 8 measures of the combination of chords and eight note lines. Then there are 5 measures of the two patterns being compressed into the same measures. Then at 89 the enigmatic chords begin. These harmonies show the conflict between the pentatonic and whole tone spheres. (Figure 35)

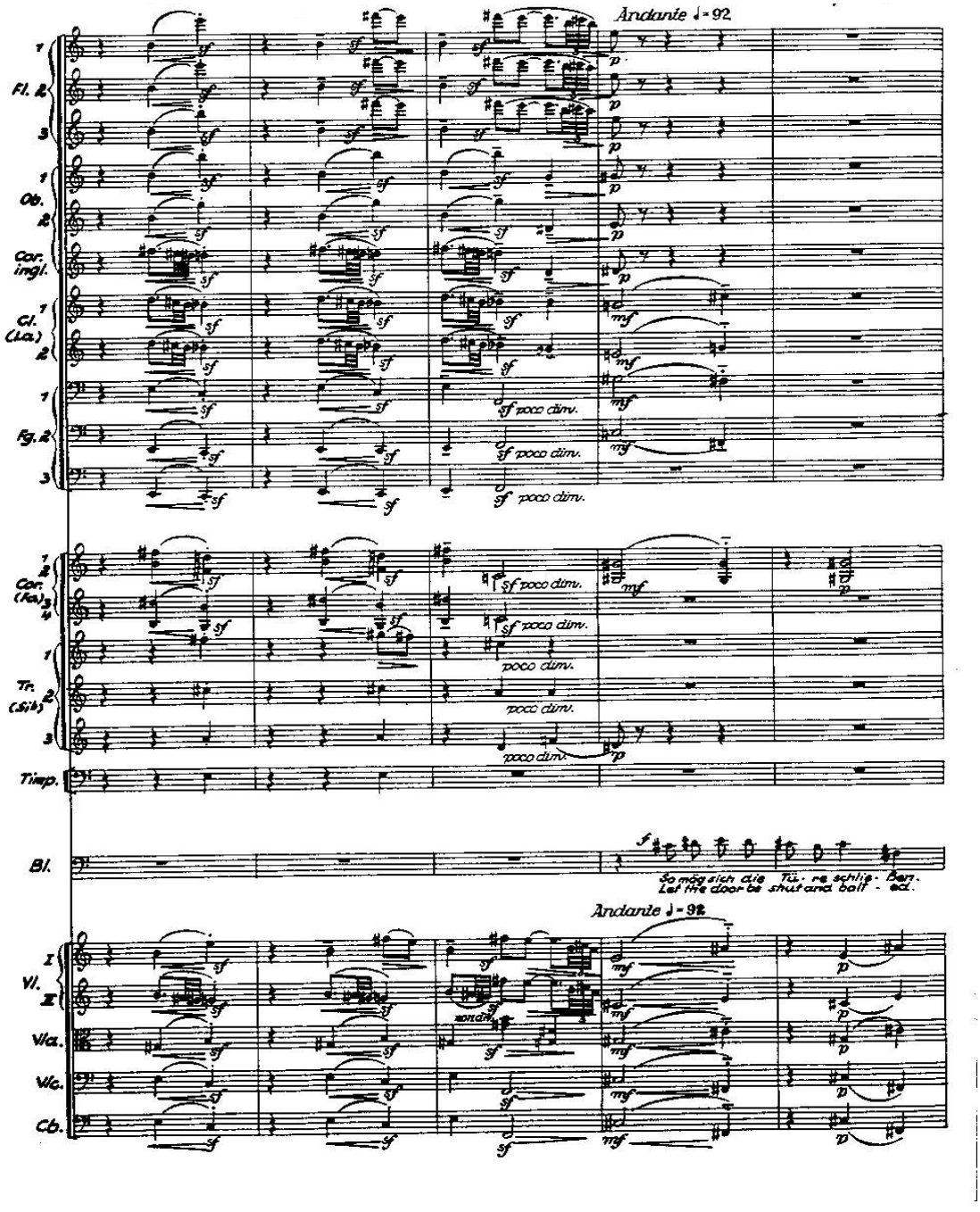


Figure 35: *Bluebeard's Castle:* mm.88-92

When we are working with pitch sets it is good to remember that great composers make mistakes, too. Pitch collections can be very tricky to work with, when sometimes the notes are incorrect. Notice that in measure 90 of Figure 35 all the other instruments playing the final triplet figure have an A marked. This includes the first violins and flutes. The second violins had an A earlier in the measure that had an accidental sharp added. If the seconds play what is written, they will retain the sharp. However, the other instruments will have an A natural. We cannot be absolutely certain that the composer wanted to have all the instruments play an A, but just having the seconds play A# would cause a large cacophony. This makes it very difficult when someone is trying to prove a certain set of pitches are what the composer was intending. Mistakes happen. They must be allowed for, including lower neighbors that do not seem to fit.

**The key to the opera.**

The entire opera turns on this point where Bluebeard gives Judith the key (the kind that unlocks doors). Again there are 8 chords, then a pause and another 8. Bluebeard interrupts the sequence with his talk of the key. Bartók waved big flags at us to tell us what was occurring. First a dramatic pause before the last 8, then a big tutti on the F – Gb (F#) to tell us that the conflict was between the two tonalities. Then Bluebeard sings Judith's name before again singing the Stefi theme. There can not be any doubt about the composer's intent here. He called that "his funeral theme" that signifies that it is his soul, not Bluebeard's that goes into the nether region with Judith, just as it did with Stefi.

The proof of the counting, has to be seen in the completed 8 after the interruption. At measure 950 (My numbers were off by 1, unless you count measure 42 that is subdivided as two. Remember the double whole notes?), the interruption of the

orchestra and the voice before the completion of the pattern with the reiterated chord, leaves no doubt as the plan that Bartók was following. And to prove this further, the chord is involved in a type of mediant cadential move to the new section, the Lake of Tears. (Figure 36)

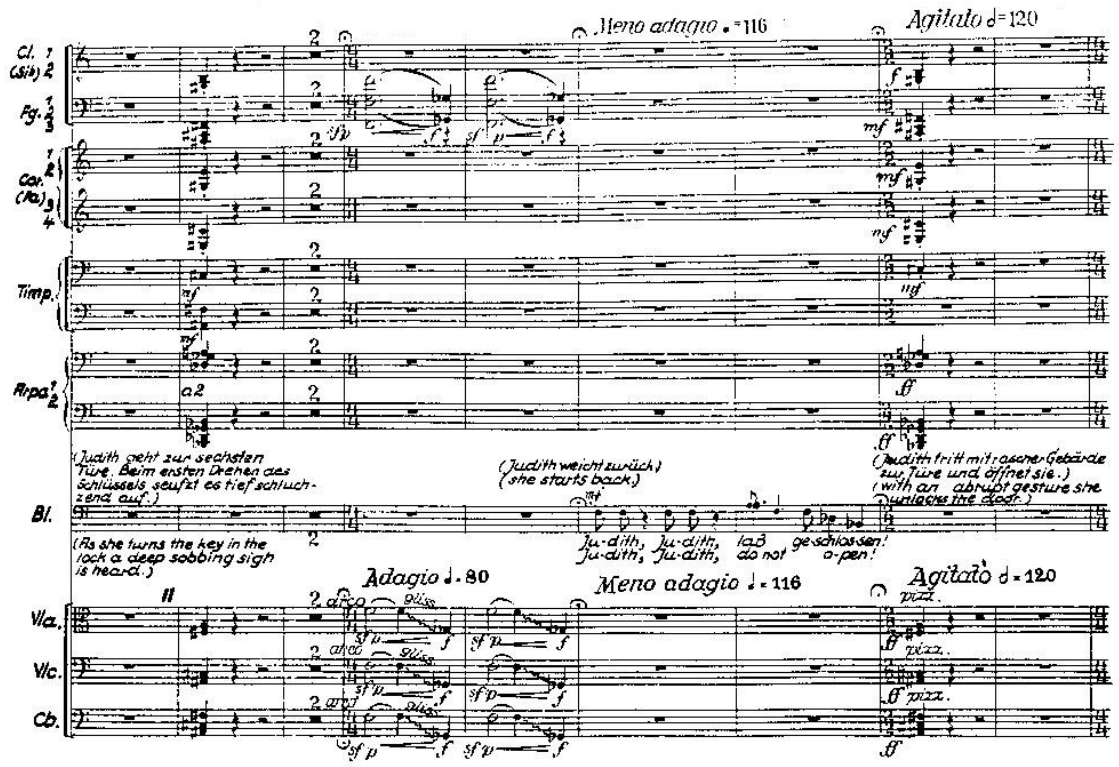


Figure 36: *Bluebeard's Castle*

**<u>The Lake of Tears</u>.**

Whose motive do we find in the Lake of Tears? The Stefi chord based on the Fibonacci chord that the Bachmann's defined for us. (The mediant cadential move is a natural move in the "new chromaticism.") Of course it would be more appropriate to call

it what the composer did, his funeral dirge. Again, it is his dirge, not hers. She elects to stay in the company of the other women. He is doomed by this. This is the hidden meaning of the opera. It is not Judith that must suffer, but Bluebeard and his alter ego, the composer. He has to carry these women and their memories inside him. He is doomed to isolation and torment, with only the memories left to him. (Figure 37) (Figure 38)

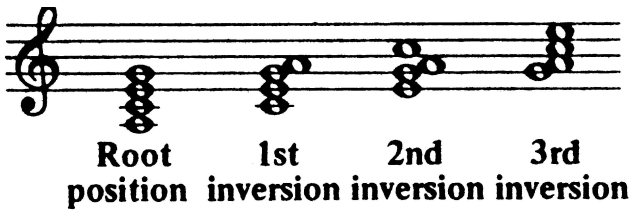


Figure 37:

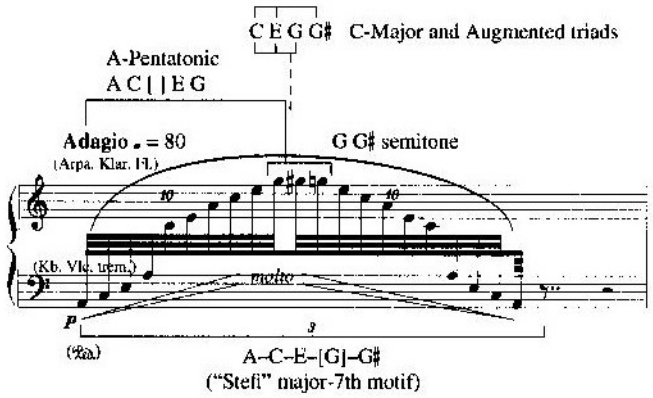


Figure 38: *Bluebeard's Castle*: Lake of Tears motive from *Musical Symbolism in the Operas of Debussy and Bartók*.[54]

There it is in microcosm, or perhaps *Mikrokosmos*. The fifth door scene has always been seen as the pivotal scene of the opera. The G.S. can be seen as helping

[54] Elliott Antokoletz, *Musical Symbolism in the Operas of Debussy and Bartók* (New York: Oxford University Press, 2004): p 250.

to prove that the composer was using the proportions of nature to determine the overall shape of the opera and the relation of the scenes and the characters.

## CONCLUSION

Bartók used Golden Section on many levels in his opera. The grand overall form and the smallest phrase segments are formed from this mathematical principle. Would he have neglected to use this principle in the melodic material? That would not seem likely when confronted with the number of different levels that we have seen so far. In fact, Bartók used the "new chromaticism" for the melodies that we hear from Judith and Bluebeard.

The natural eight beat rhythm of the Hungarian language became one of the elements on which the opera is based. This combines with the 8 of the Fibonacci Series to give us numbers that become significant to the characters and the drama. Number symbolism and musical symbolism and dramatic symbolism all combine to create a new level of meaning and complexity in Bartók's music.

# Chapter Five

## The "New Chromaticism" in Opera and the

## *Cantata Profana(1930)*

**INTRODUCTION.**

There has been an extensive discussion of rhythmic figures, harmonies, themes, Golden Section and motives. What about the "new chromaticism?" When all of these other elements are being influenced and determined by the Golden Section the melodic texture of the counterpoint surely is a function of the Golden Section as well. It would be very surprising not to find that Golden Section was not involved. After all, scholars have been attempting to find this in Bartók since the beginning of Bartók scholarship. We have quoted mamy of the works of Lendvai and others. Thousands of pages have been printed on this subject. These are much too pervasive to not be found on every level. Until now the attempts to find a scale based on the Golden Section have been unconvincing. The "new chromaticism" is the key to unlock the castle's doors.

**THE OPENING OF THE OPERA.**

Now let us examine the entire melodic material of the vocal lines and see if G. S can be found to be the basic language. If you remember the "new chromaticism" from the previous chapters then you will recognize this rendering of the notes that make up the first 37 measures of the opera. This includes the melodic material before the voice enters. I spent a great deal of time trying to make the first part of the opera fit the usual G.S. numbers of Lendvai's theories. Then I realized that the first measures of the opera are a unison melody that naturally leads into the beginning of the vocal lines. After finding the melodic treatment of the early folk song cycle discussed earlier it suddenly became clear that the composer was using the same treatment here. The melody was according to the "new chromaticism" while the orchestration was freely composed. This made sense from my own feeble attempts at composition. It seemed to be a natural way to approach these melodies. Bartók tells us that he created this "new Hungarian art music" through first polymodality and then developing his own melodies derived from folk music. These "new chromatic" melodies are alternated with sections of pentatonic. There is plenty of room for argument with whether it is pentatonic. He did not separate them.

**Table of the Melodies**

Here is a short version of the long table in Appendix 1. It should be a short cut to the study of these many melodic fragments. All pitches of the vocal lines of Bluebeard and Judith are found in Apendix 1. The list that follows is comprised of the collections that are complete or contain more than the normal number of pitches found in a mode. Every large segment of pitches uttered by Bluebeard and Judith can be found to fit into a transposition of this collection except the one in the middle that I have noted is

from the “Chromatic Melody” that contains eight half steps. Later there is a discussion of the *Cantata Profana* that will show that the composer is using a mirror of the procedure in the opera. In the cantata, he begins with the “Chromatic Melody” and then has one example of the “New Chromaticism” in the middle of the piece.

| | | |
|---|---|---|
| 1-37 | C C# D^E ^F# G G#A^B<br>1 1 2 2 1 1 1 2 | |
| 66-82 | C^D^E^F# G G# A^ B<br>2 2 2 1 1 1 2 | |
| 103-148 | ^C#^D# E^F# ^G# ^A# B<br>2 2 1 2 2 2 1 | |
| 172-193 | C Db D Eb^F^G Ab^Bb^<br>1 1 1 2 2 1 2 2 | |
| 291-306 | C C#^D#E^ F#^A^B<br>1 2 1 2 2 2 1 | |
| 327-328 | C Db D Eb^F^G Ab^Bb^<br>1 1 1 2 2 1 2 2 | |
| 379-386 | C#^D#E F F#^G#^A# B<br>2 1 1 1 2 2 1 2 | |
| 523-527 | C^D^E F^ G Ab A Bb^<br>2 2 1 2 1 1 1 2 | |
| 664-671 | C^D^E F^ G Ab A Bb^<br>2 2 1 2 1 1 1 2 | |
| 695-698 | ^Db^Eb^F Gb^ Ab A^ B<br>2 2 2 1 2 1 2 | |
| 841-848 | C^ D^ E F^ G Ab A Bb^<br>2 2 1 2 1 1 1 2 | |
| 898-907 | C^D Eb^ F^ G# A A# B<br>2 1 2 2 1 1 1 1 | “Chromatic Melody” 8 half steps |
| 1020-1022 | C^D Eb E F^Ab A^^<br>2 1 1 1 2 1 3 | |
| 1025-1033 | C^D Eb E F^Ab A^^<br>2 1 1 1 2 1 3 | |
| 1078-1086 | C C#^D#^F F# G Ab^^B<br>1 2 2 1 1 1 3 1 | |

Underscore denotes x-cell or half step relation.

**Tables discussed.**

Looking at this table should leave no doubt that much of the material of the opera can be explained through the "new chromaticism". I have only labeled those parts that can be shown to be a particular form of the scale. All other pitch collections have the potential to be in a form of the scale. There are no collections in the opera that can be shown to be outside of the pitch system of the "new chromaticism".

Other analysts could argue with these groupings and there are undoubtedly mistakes in the groupings where more could be grouped together to form whole collections. In the most part the collections are divided by the entrance of the other voice part, or interludes or changes of sections, clearly marked. This is an initial study with much deeper study being required.

**BEGINNING OF GOLDEN SECTION STUDY**.

When I first began to look for these Golden Section numbers in the harmonies of the opera, they seemed to be there, but there were problems. The initial unison melodies of the opera seem related to the 0,1,1,2,3,5,8 of the G.S. They didn't seem to be contained by those numbers. One would have to make segments of them at odd places. Then later, after the study of the folk song settings, I came back to the opera and found that the melody continues on into the voice parts. The "new chromaticism" in the first 37 measures includes the orchestra, Judith and Bluebeard's vocal melodies.

The piano reduction is shown here for space saving purposes. The first 20 measures give enough to get the most part of the pitch collection. Trying to make the G.S. numbers fit is a tantalizing feat, where it can almost be made to work. It is a real delight when the frustration ends when the "new chromaticism" is applied. (Figure 39)

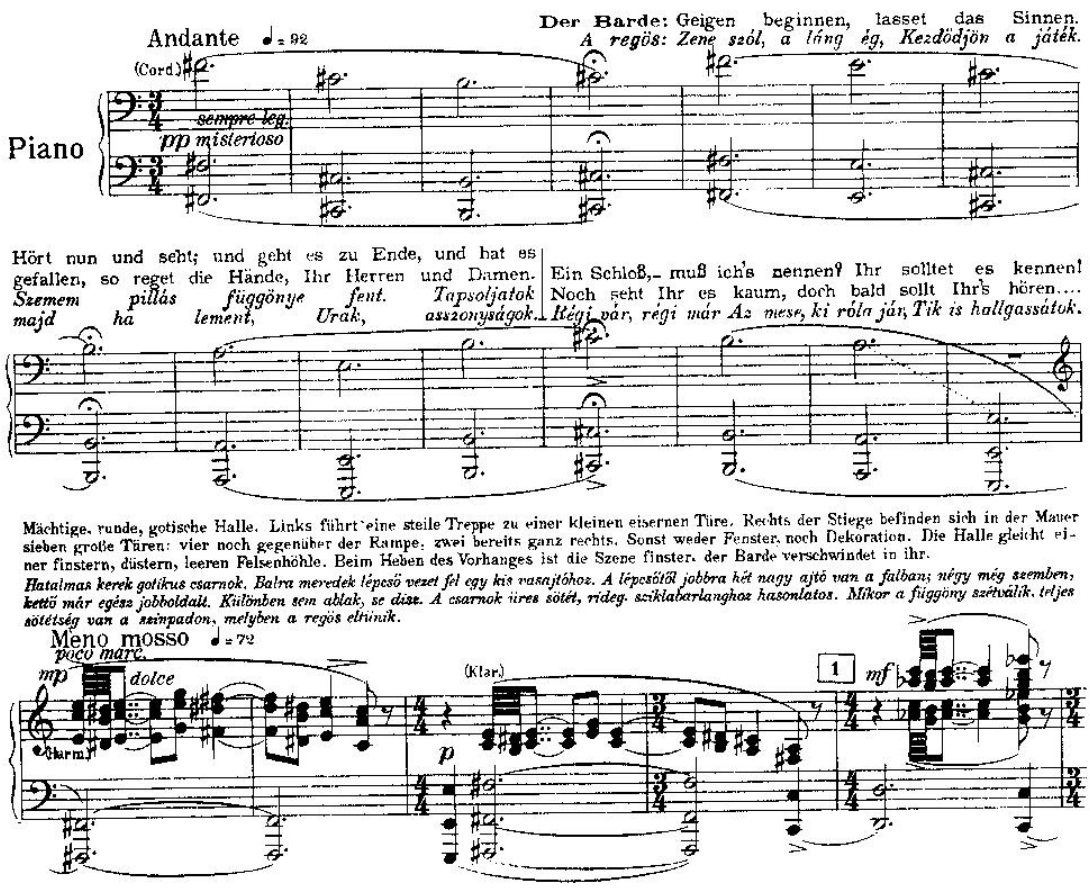


Figure 39: *Bluebeard's Castle* - beginning

Suddenly the difficulties are resolved. The entire melodic line can be shown to be part of the "new chromaticism". If there are pentatonic segments, it is covered by what the composer said in his Harvard lectures. He said that he alternated his new melodies with the pentatonic. "Another and different characteristic, as you will probably remember, is the appearance of pentatonic melody structures in our work, as a contrast – so to speak – to the modal chromaticism, although both may be combined."[55]

[55] Béla Bartók: *Essays,* ed. by Benjamin Suchoff. (New York: St. Martin's Press, 1976), 376.

The bass melody continues with a free accompaniment just as we saw in the early folk song settings written at the same time. Look at the beginning of our chart, the first 37 measures in Judith's part combine with Bluebeard's pitch collection to give an entire "new chromaticism" in order to establish the "key" of the opera. Bartók told us that his "new chromaticism" was from the melodies that he developed. At first it seems that the B is a problem, but later the collection becomes evident. It is based on B, the collection built on the tenth scale degree. As the opera continues, a number of different forms of the scale are evident. Identified in the table are the 0, 2, 3, 6, 7, 8, 9, 10, and 11 forms. There are pentatonic, symmetrical forms and a whole tone version that I thought was not possible. The composer shows how many permutations are possible including unique and exotic symmetrical forms.

Let us examine them more closely. Measures 47 through 49 have a form of the collection that is incomplete. C# - D – E - F# - G# - A - B is preceded by a transitional passage that is unstable, leading to this strong statement by Bluebeard. When we combine the tones from the entire statement we find the following collection: C – Db – D – Eb – E – F – F# - G – G# - A – B (Figure 38). This is nearly a 12 tone collection. It lacks one tone to make it complete: Bb. This is very similar to the melodies in the *Cantata Profana* that will be discussed in the next section. The composer told us in his lectures that his "new melodies" contained at least eight half steps. When there are more, as in this case, identification becomes less exact. This is part of a sequential statement that creates an overall chromatic feeling out of repeated modulations. Each segment can be analyzed as in our main diatonic determinant: the "new chromaticism".

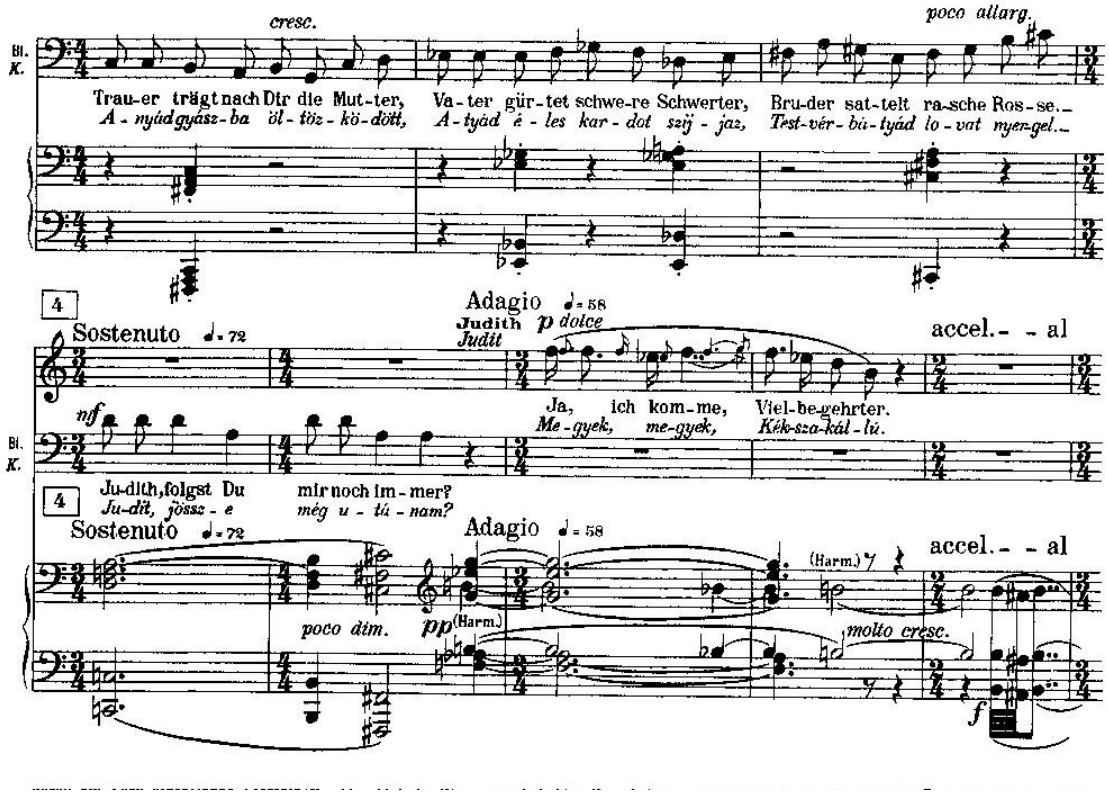


Figure 40: *Bluebeard's Castle* mm. 44-48.

Measures 52-82 contain the collection C - ^ - D - ^ - E - ^ - ^ - F# - G - G# - A - ^ - B. This is the form built on the B, the 11th degree. Notice that there are 4 half steps from F# to A, leaving only mode mixture or chromatic devices as our explanation. Bluebeard attempts to introduce the new collection, with a Bb in measure 64. The new form of the collection that cannot form a traditional scale, ^ - C# - ^ - D# - E - ^ - ^ - F# - ^ - G# - ^ - A# - B, is not complete but cannot be the same collection. It could either be built on the 0 or the 2, C or D. The next form is quite interesting. It is symmetrical and can be inverted. Measures 151-161 contain D - ^ - E - ^ - F# - G - ^ - A - ^ - B. This is symmetrical around the F# G combination. The next, 172-193 brings us back to the full

prime collection. As one might expect this brings a new section, clearly marking new material that is very unstable. The transitions cause dubious analysis. This agitated section commences with a white key collection that falls within the collection. It at first glance looks to be whole tone, but cannot be with E and F a half step apart. C - E - F - G - A - B, is a collection that is very unstable and sounds hollow, lacking any coherence. They are seeking and longing for their missing parts that Bluebeard has failed to provide. Judith is expanding on the several notes that Bluebeard had introduced. Another of the 11-tone collections occur shortly thereafter in Judith's melodic material from 202-214.

**Complete collections**

More instances of almost complete "new chromaticism" collections occur in measures 268-273 on the 10th scale degree. (Figure 41 and 42)

Notice that the Eb entrance in Figure 38 is identical to the D# entrance in Figure 41. The underlying harmony has changed leading to the conclusion that a sequence is occurring (Fourth measure of 22 and entry at 23). If one were to analyze from Number 23 onward through 305, the following collection would result: C-C#-D#-E-F#-G#-A-B. This might make one think that this is a Romanian mode. This occurs in the *Cantata Profana* in the next segment. The problem is that this collection occurs during sequencing and it is created through neighbors and passing tones. There is no feeling of a true Romanian mode here.

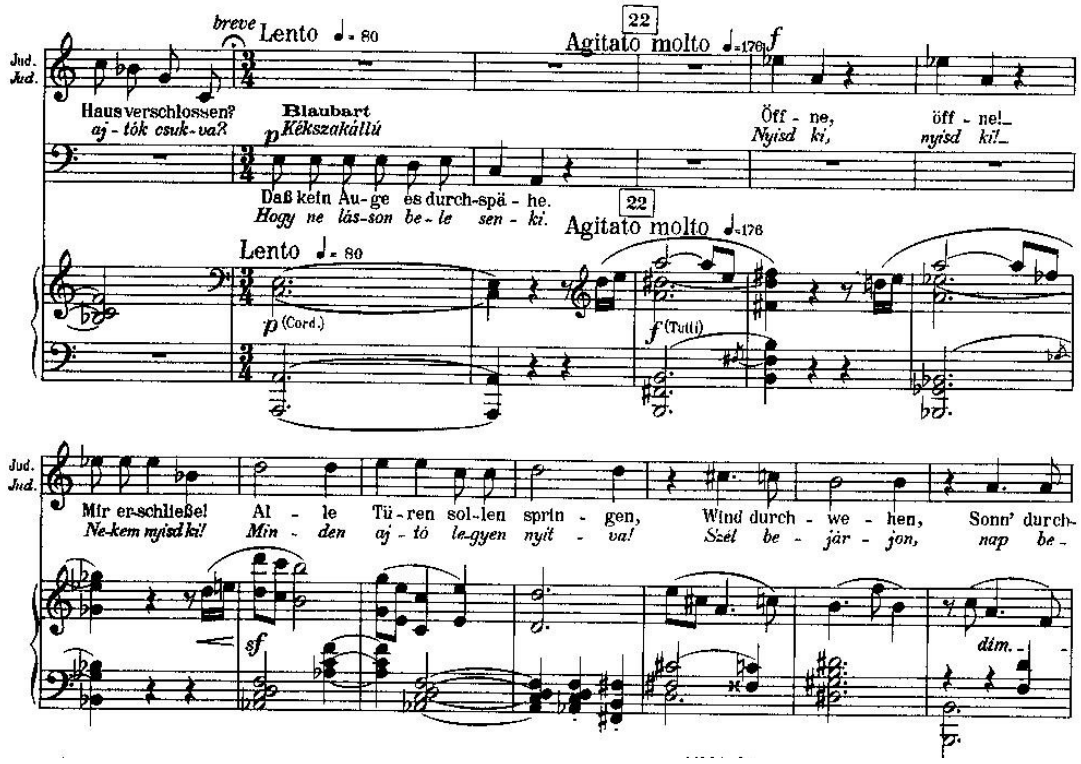


Figure 41: *Bluebeard's Castle mm.* 259-271

And also in 291-306, the entries are very spread out over fifteen measures so that they would be difficult to connect as one collection. In contrast, the next statement comes in a long interjection, two connected phrases. In this concentrated form, it is much easier to see that this is entirely one collection. (Figure 43) There is only one missing note so it would be very difficult to say that this is a traditional tonal scale. The lower tetrachord has a complete x-cell, of four half steps. That is not a structure found in any of the scale forms of tonal music. The upper tetrachord has three members present, (actually making it a trichord) this is not a usual form in tonal music either.

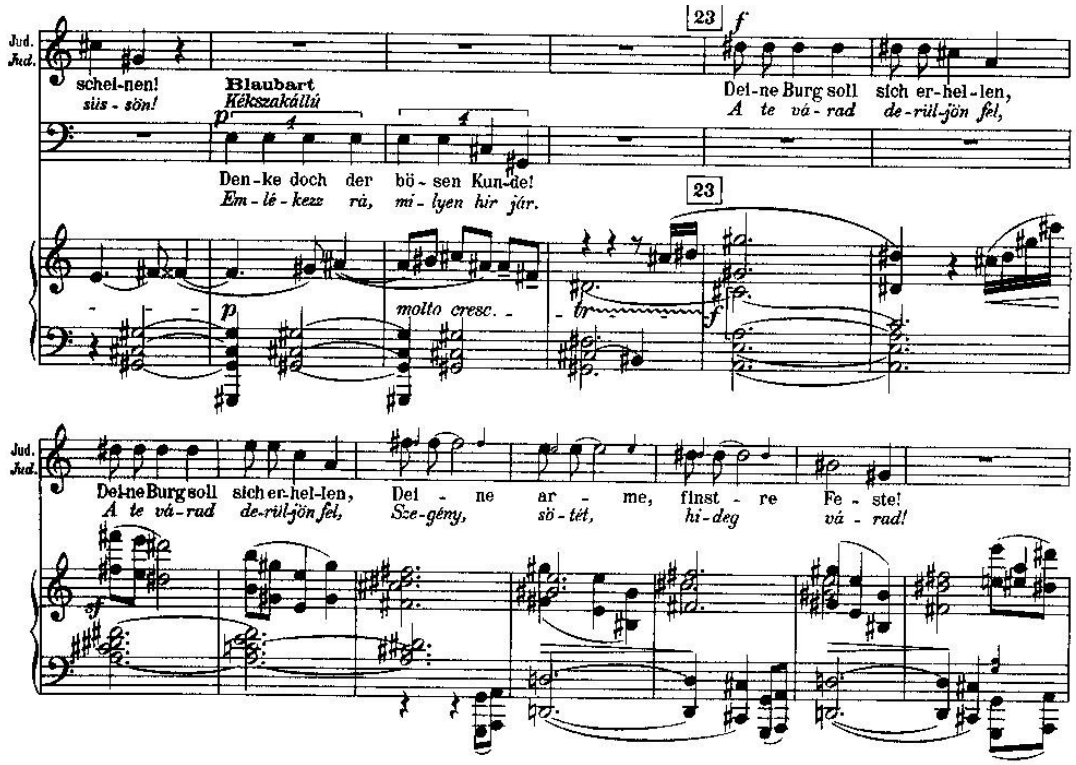


Figure 42: *Bluebeard's Castle:* mm. 272- 284

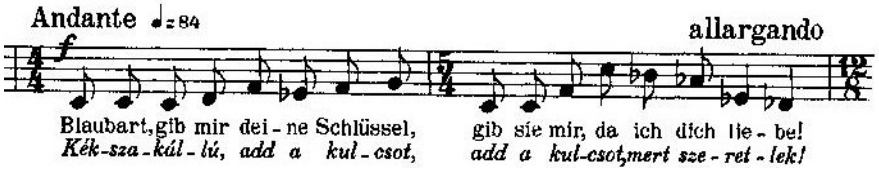


Figure 43: Bluebeard's Castle 1 after number 28

The next instance uses enharmonic spellings to disguise the collection. (Figure 44) Judith's A# and Bb are enharmonic spellings. This occurs over an ostinato in the strings and repeating figures in the winds. Why? Why use an enharmonic spelling when the orchestra is constant? The next section contains repeated emphatic statements that do

not contain enough pitches to give a tonal reference. Then, in measures 379-386 the wind figures return with new but similar material in the strings. This returns gradually with the winds starting then the strings begin gradually to reenter. This time the melody that Judith sings adds to the pentatonic collection from 359-361. C – E – Gb – Ab - Bb has new members added to bring the almost complete "new chromaticism" C# ^ D# - E - F - F# ^ G# ^ A# - B. This scale does not have the C that one would expect, but it does have an x-cell that makes remote the possibility of it being a traditional scale form. It should be repeated that there is no real necessity for the composer to use every note of the scale. Unlike the first three songs of the *Eight Hungarian Songs*, this earlier usage is using the new scale for the melody. In the case of the later songs, the entire collection is also used as the harmonic framework. That type of usage would encourage the presence of all the pitches. For melodic fabric the entire collection would not be necessary. Look at the next illustration and you will see that the "new chromaticism" is used in a context where the harmony is not changing. This would indicate that the pitches are all of one scale. It would be unusual to have a melody changing scales while being accompanied by an ostinato figure in the orchestra. The flutes and 1st violins repeat that same figure (seen in 359-361) while the strings have a new ostinato figure that moves in contrast to the strings but changes and develops.

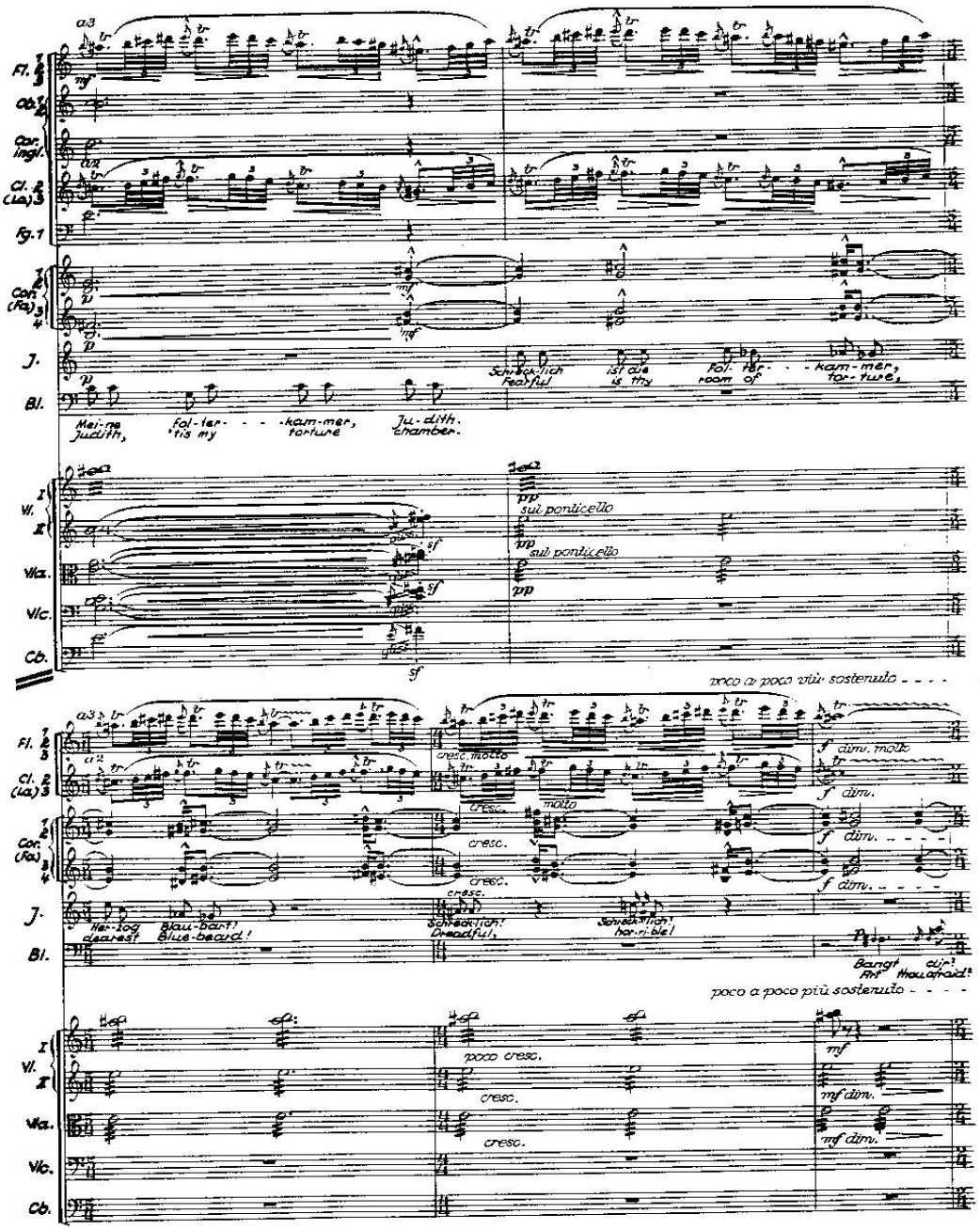


Figure 44: *Bluebeard's Castle* mm 357-361

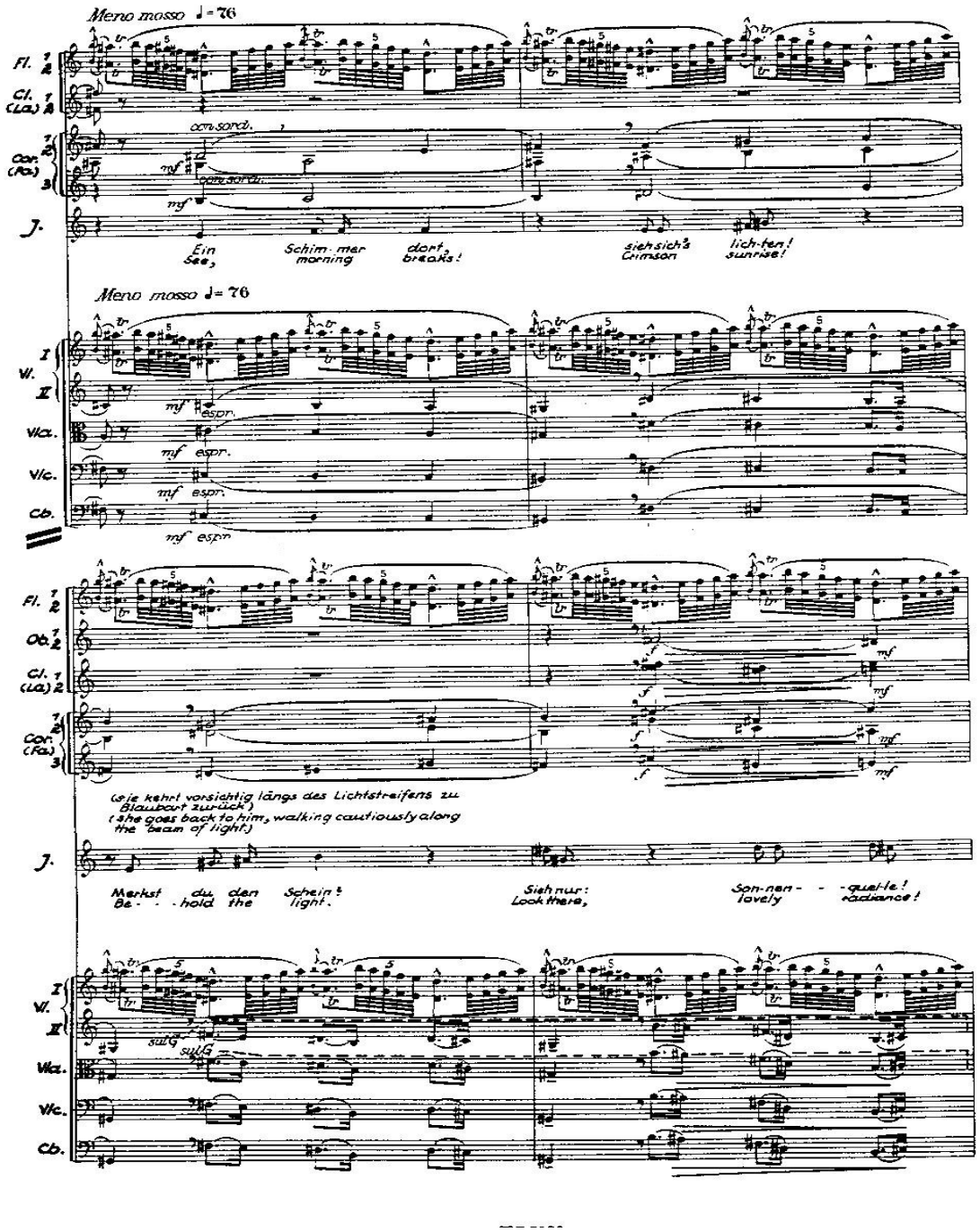


Figure 45: *Bluebeard's Castle* mm 381-384

The section that begins on number 55 is another good example of the growing chromaticism of this early work creating unusual combinations. The melodic material of Judith would seem to form an Octatonic segment. This would be exceptional, as the Octatonic scale was not known at this time. The collection from number 55:

C - C# - D# - E - F# - G - A - B. The sequencing of the C – C# becomes clear with reflection. The F# - G undergoes similar treatment in the next section.

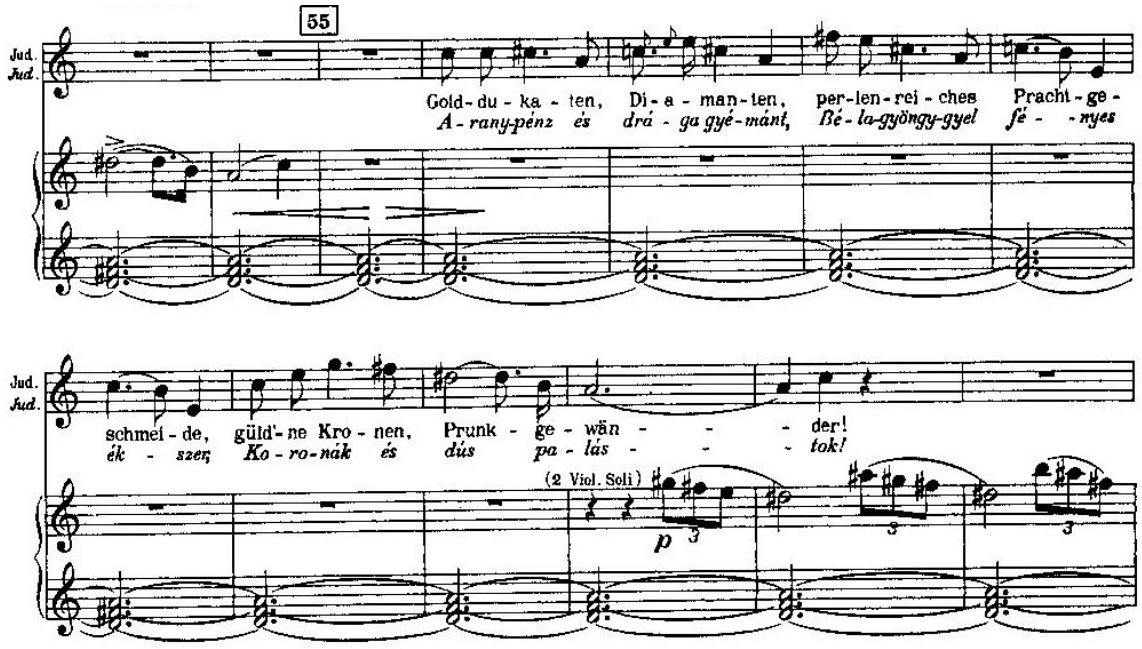


Figure 46: Bluebeard's Castle mm 565-577

The rest of the melodic material of the piece can be shown to derive from the "new chromaticism". Just as in dividing the modulation points in tonal music there could be arguments about the exact point of separation. In most cases, the separation occurs through the interjections of the other voice.

**Progression of the Opera.**

As the opera progresses we will see that the balance changes from Judith to Bluebeard. Judith uses less and less complete forms. Bluebeard becomes more impassioned as the work progresses and uses more complete forms. There is a very interesting formation at 1076-1086.

Bluebeard uses a form that is symmetrical and could be counted from the top or bottom. It has two notes missing. If one starts from the upper one and counts up, you get one collection. If you start from the lower one and count down, you get another. This occurs close to the Golden Section point of the overall opera. C - C# ^ D# ^ F - F# - G – Ab ^ - ^ B. Start from the Bb and count up and you have one collection. Start from the Ab and count down and you get another. There is no way to determine which is correct.

***CANTATA PROFANA***

The *Twenty Hungarian Folk Songs* from 1929 is very similar to the work completed the next year, 1930. Bartók wrote a large choral work with Baritone and Tenor solos. In his Harvard Lectures that we discussed earlier, he said that the fugue theme from the *Cantata Profana* was one of his first chromatic melodies. We should examine it and the movement it begins.

> My first "chromatic" melody I invented in 1923; I used it as the first theme of my Dance Suite. . . . This kind of melodic invention was only an incidental digression on my part and had no special consequences. My second attempt was made in 1926: on that occasion I did not try to imitate anything known from folk music. (There is a note for a number of examples. We will look at the Cantata Profana: fugue theme. The Fourth String Quartet, second movement, is another) I cannot remember having met this kind of melodic chromaticism deliberately developed to such a degree in any other contemporary music.
>
> As to the general characteristics, exactly the same can be said about my melodies as what I said concerning the chromatic folk melodies. That is, the single tones of these melodies are independent tones having no interrelation between each other. There is in each specimen, however, a decidedly fixed fundamental tone to which the other tones resolve in the end. The main difference between the chromatic folk melodies and my own chromatic melodies is to be found in their range. The former consist exclusively of five, six or at most seven half-tones, which corresponds to a range of about a fourth. My own melodies generally have at least eight half-tones and cover, in some cases, the distance of an octave or more.
>
> The working with these chromatic degrees gave me another idea which led to the use of a new device. This consists of the change of the chromatic degrees into diatonic degrees. In other words, the succession of chromatic degrees is extended by leveling them over a diatonic terrain. [56]

[56] Béla Bartók: *Essays,* ed. by Benjamin Suchoff ( New York: St. Martin's Press, 1976)379-381.

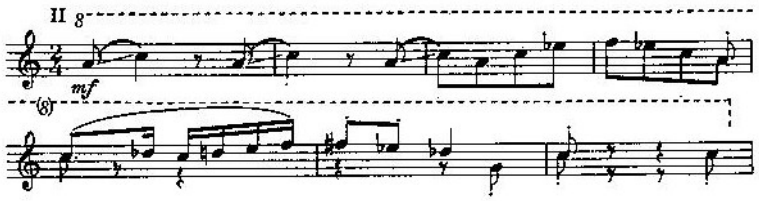


Figure 47: Harvard Lectures

Figure 47 accompanies the text above. These have been repeated in hopes that the reader will make the same realizations that I made after reading these quotes several times. One should note that there is a pitch class missing unless one spells the Cb as a B. This author's suggested example shows that there are whole steps inserted to fill out the scale. The original example is unknown so this is a reconstruction from Bartók's notes for the lecture. The group of notes covers an octave, but where would the whole steps fall? C seems to be the most important note. There are half steps below and above it. The whole steps can then be said to come anywhere inside the octave. This reinforces what we discovered earlier in the quotes on the "new chromaticism".

Let's take a look at one of the suggested examples of chromatic melodies. The "fugue theme" of the *Cantata Profana* is one of the most easily identifiable.

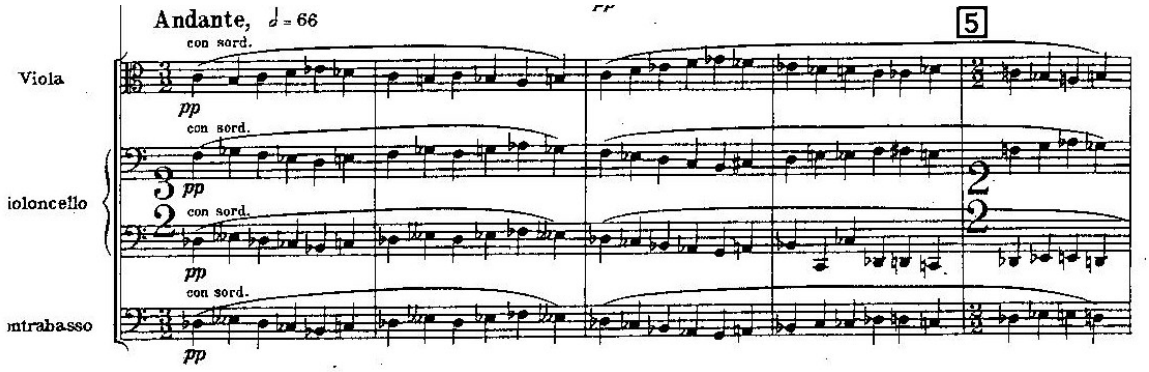


Figure 48: *Cantata Profana beginning*

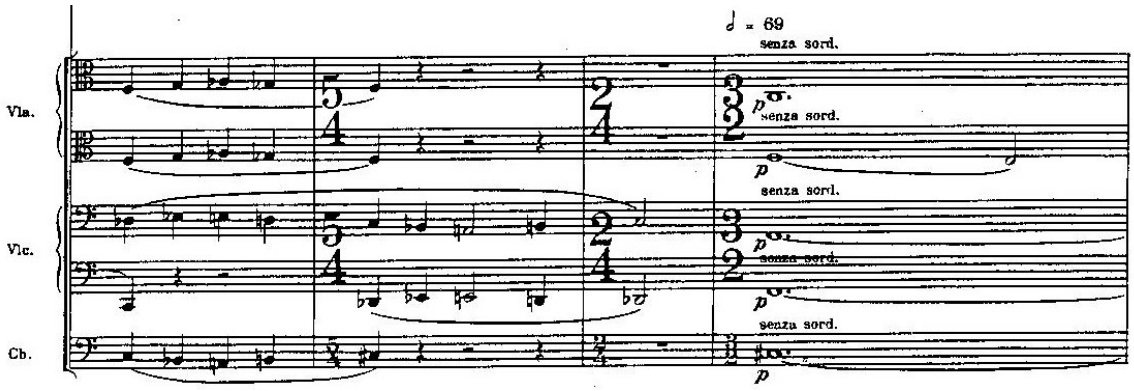


Figure 49: *Cantata Profana mm6-9*

Here the strings are quick to use all twelve tones. This is not the fugue theme, but the introduction. Remember in our previous discussions that Bartók stated that he was using two modes a half step apart to create the "new chromaticism"? Here we have a theme that starts on three notes. One note is C and another voice starts on Db, a half step away. The third voice starts a third above the lowest voice. Notice that there is a

cadential figure that comes to rest in the 2/4 measure. Here are the first two notes to which I drew your attention: C and Db.

The first modes that Bartók used for his polymodality were Lydian and Phrygian. They would normally start on E and F. One of the voices here starts on F. The voice that starts on F ends on C. The voice that starts on C ends on F. This is an amazing counterpoint. Two voices, cello and contrabass, move together a third apart. The violas move in contrary motion, starting a half step apart, making a mirror image of the other voices.

Remember in the folk song collections we saw how Bartók was alternating different methods. He told us that he alternated Pentatonic with his "new chromaticism". Here he starts out with all twelve tones. In the songs it was normal to find all 12 tones at endings or moments of excitement. Here he opens the movement with intense chromatic movement in the introduction. As preparation to a fugue, an introduction would be free counterpoint. Instead there is a strict inversion of two voices while the lower is in parallel motion with a voice a third above.

At measure 9 the vocal fugue starts. The tenor immediately answers at the interval of the fifth. These continue in strict counterpoint through measure 17 where the alto enters with a new pitch level and collection (Figure 50). Both the alto and tenor use the same pitch collection in an inversion starting a measure apart. This is an interesting pitch collection, in that it seems to anticipate the one we found in the folk songs.

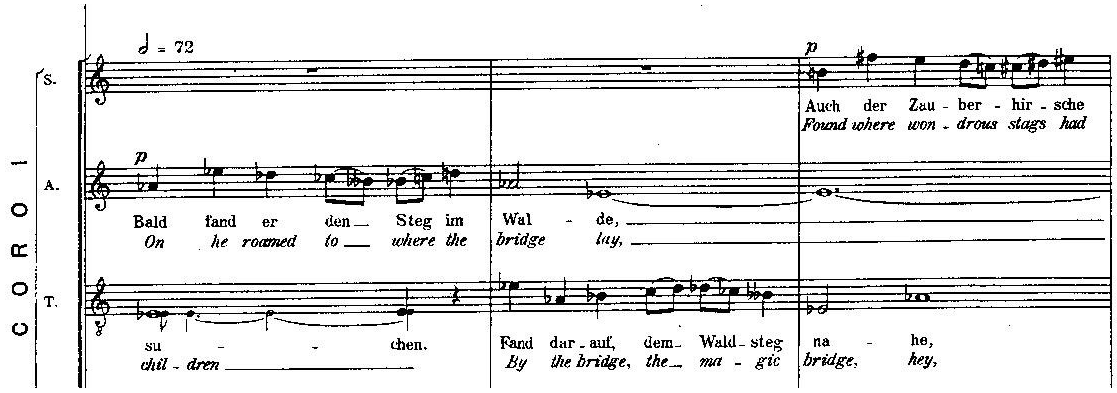


Figure 50: *Cantata Profana 15-18*

Here there are eight notes stacked a half step apart. The soprano follows suit with another eight notes starting on B instead of the Ab that started the alto collection. This is the expansion of the folk melodies that the composer told us about in his lectures. Where a folk melody might have as many as 7 half steps, this has eight. It is not expanded to cover the octave, so it can only be used motivicly.

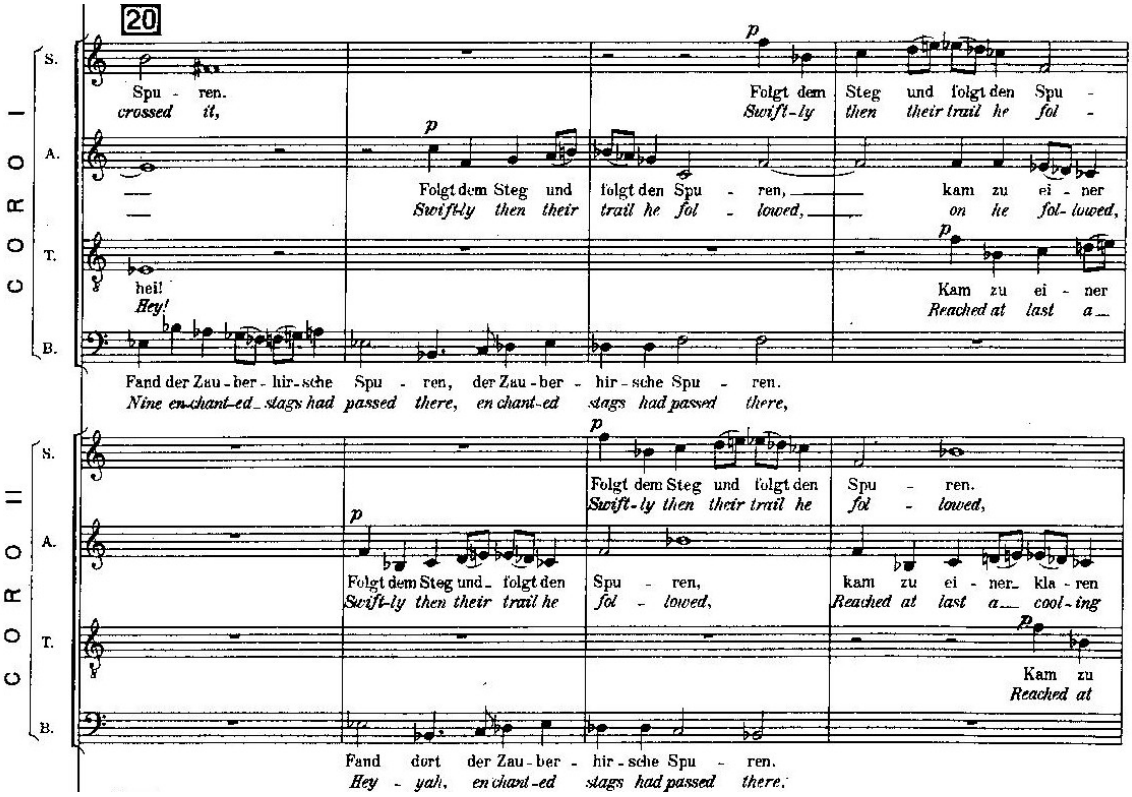


Figure 51: *Cantata Profana mm 20-23*

A new version of the pitch collection occurs at m. 20 in the bass (Figure 51). This begins to resemble the expected form. Here we have 9 notes over the span of an octave, instead of a gapped collection over a smaller span. C - Db - ^ - Eb - ^ - F - Gb - G - Ab - A - Bb - ^. The alto starts in the next measure, the B is added in the transition, the last measure before the next section, m. 26 (Figure 52).

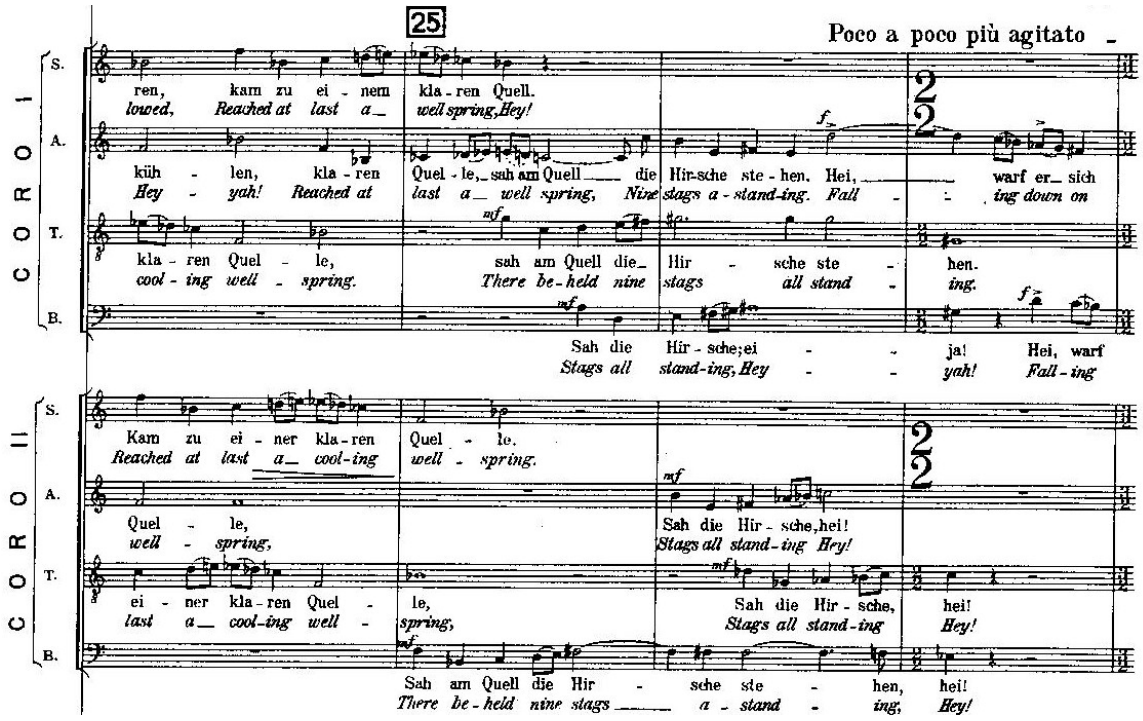


Figure 52: *Cantata Profana mm24-27*

The sopranos of each choir use the earlier form of the collection. Bb - B - C - Db - D - Eb - E - F. The tenors on the other hand have joined the basses in a new type of collection. C - Db - D - Eb - ^ - F - F# - G - G# - ^ - Bb - ^. This is our "new chromaticism" scale without any mistake. For this section we see that there is a transition from the earlier form through the slightly off version of the basses and altos. Their version would be correct if the A were the missing note instead of the B. Can this be blamed on counterpoint? It made for smooth voice leading. Look at the basses of the second choir. They have a somewhat ambiguous collection. There are too many notes missing. You cannot form a normal scale from this collection. Bb - ^ - C - Db - ^ - Eb - E - F - F# - - - . The bass collection from coro I is here but with the missing notes it could be the "new" collection or other possibilities.

This is a reversal of the procedure from *Bluebeard's Castle*. Earlier we saw that the pitches that form the vocal melodies of Judith and Bluebeard are formed from our "new chromaticism" until almost exactly the middle of the opera. Then we find an example of the "chromatic melodies" that he discussed in the "Harvard Lectures" that are comprised of eight half steps. They were not like the folk melodies that were in modes but contained up to six half steps. In this work we find the mirror image of the opera. Here the "chromatic melodies" are interrupted by one example of the "new chromaticism" as we found in the proceeding discussion.

It is becoming clear that Bartók was showing us a procedure. The "new chromaticism" is growing organically from the soil of 12 tone chromaticism. It begins with series of half steps that was common in folk music. It was spread over an octave to make it possible to have a "diatonic plain" that included the entire octave. Then the composer can use the normal set or add notes to form the entire 12 note collection. This avoids the problem that he stated in his lectures: there could not be true atonal music given a harmonic's relation to the fundamental.

The next section takes us to measure 38. It is an exploration of the contrast of modal writing. The alto voices in each choir have the stacked half steps expanded to an octave that we saw in the example from the Harvard lecture. Two whole steps fill out the octave connecting the half step chromaticism in the style of folk music. The other voices are pure folk mode writing.

From 38 to 42 there are not enough notes to say for certain, but it seems to be an octatonic segment. It serves as a transition to the all twelve tone chromaticism of the solo that we saw earlier in the piece. The choral fugue is the focus of our study, showing the new style that we are addressing in this paper. The solos take us up to 97 where the choirs re-enter (Figure 53 and 54).

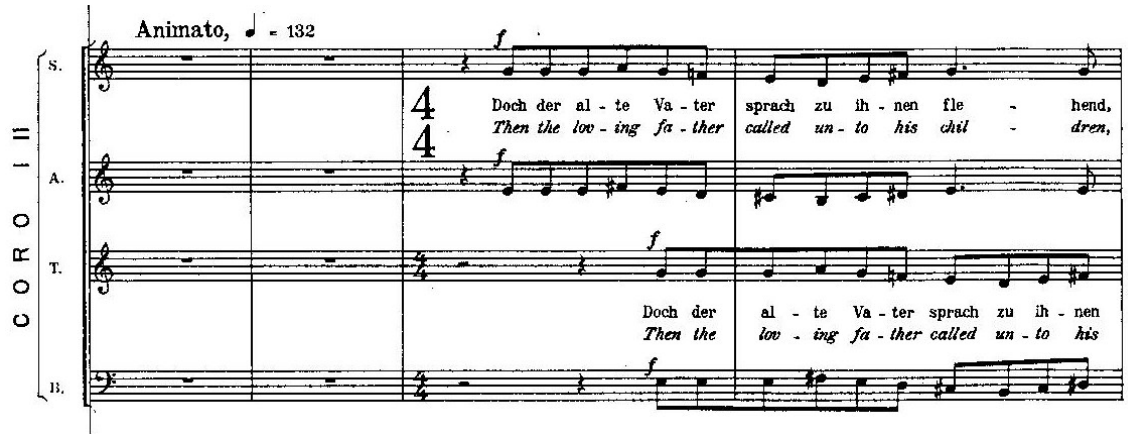


Figure 53: *Cantata Profana mm96-99*

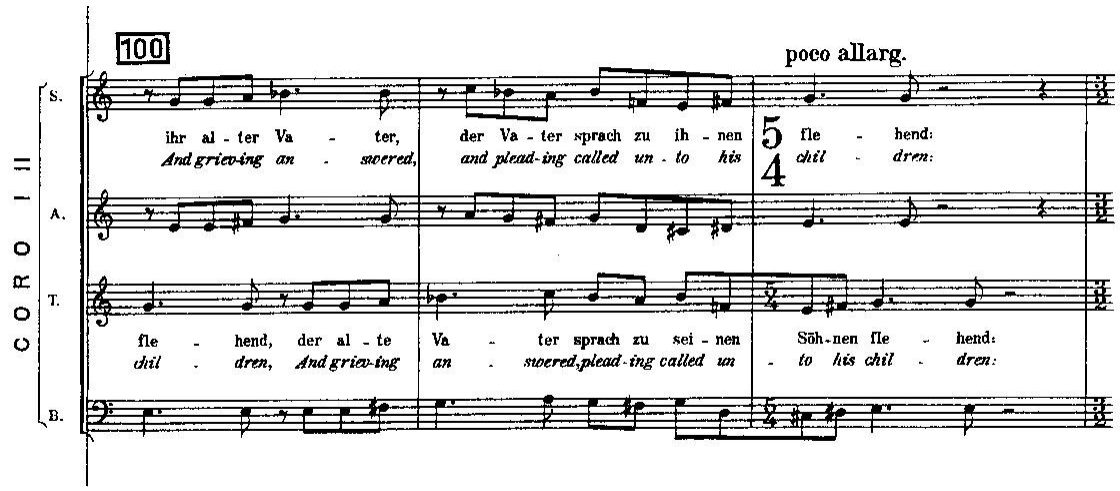


Figure 54: *Cantata Profana mm100-103*

A classic double-cannon forms the texture of this choral interlude. The two lines in the soprano and alto are repeated in the tenor and bass. Each voice of the cannon has it own collection.

^ - ^ - D - ^ - E - F - F# - G - ^ - A - Bb - ^ missing C and B

^ - C# - D - D# - E - ^ - F# - G - ^ - A - ^ - ^ missing Ab and B

Why should these collections be identified this way? Each contains a four note segment of half steps. That eliminates all modes except the Dalmation. If one were to combine the two collections, the familiar stacked half steps seems the best answer.

^ - C# - D - D# - E - F - F# - G - ^ - A - Bb - ^

1 1 1 1 1 1 2 1 2

The argument against this of course remains the half step between the Bb and the C#. If the Bb was a B or the C# was a C then the scale would be a filled in half step segment. As it stands, there would be a real problem with calling this a pitch collection from what we have been finding out about Bartók's use of the chromatic intervals. He showed in the lectures (Figure 53) that the chromatic collections could be leveled over a diatonic plane by adding normal whole steps in between.

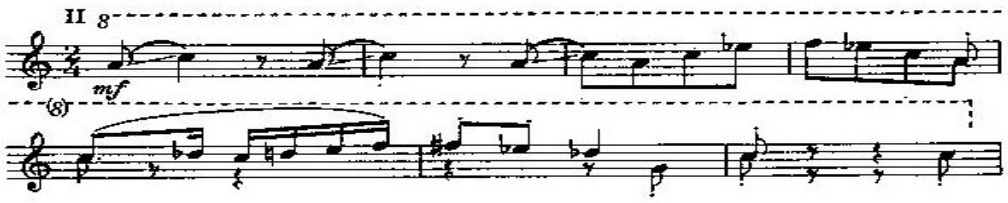


Figure 55: Harvard Lectures

The next choral segment occurs at mm. 108 – 114 (Figure 56 and 57). The comparison method could be instructive in this case as well.

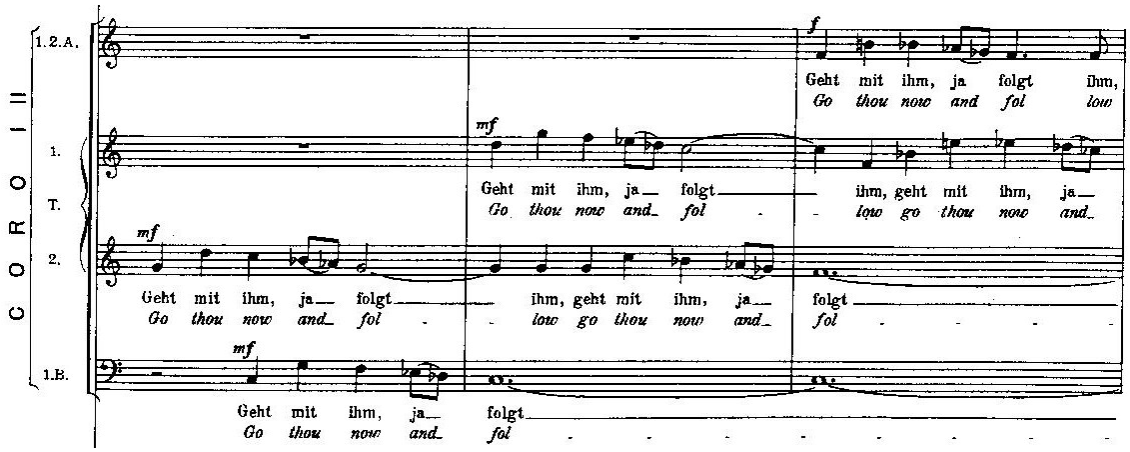


Figure 56: *Cantata Profana mm108-110*

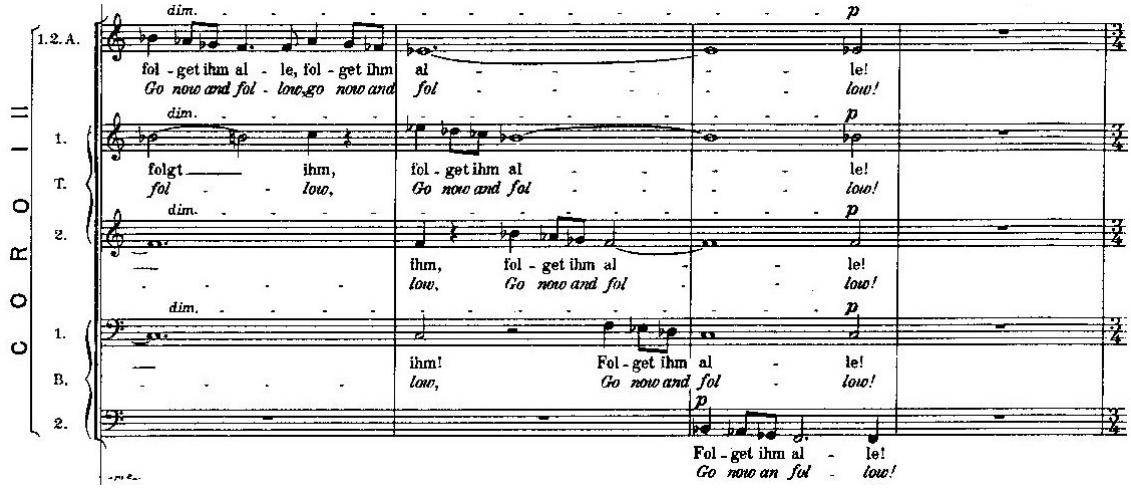


Figure 57: Cantata Profana mm111-114

Sop. ^ - ^ - ^ - Eb - E - F - Gb - ^ - Ab - ^ - Bb - B

Alto C - Db - D - Eb - ^ - F - ^ - G - ^ - ^ - Bb - B

Tenor C - ^ - D - ^ - ^ - ^ - F - Gb - G - Ab - A - Bb - ^

Bass C - Db - ^ - Eb - ^ - F - Gb - G - Ab - ^ - Bb - ^

Examining these collections makes it plain that the common element is the four all have a segment that includes four half steps. The tenor and the alto have six half

steps, showing their connection to the earlier form of the theme. Both of the other themes show their "new chromaticism" more directly. Each has one note missing from the complete collection. Again it must be said, when one writes in a particular key in tonal music, it is not necessary to use every note. In short themes the opposite is true. This is true of folk themes as well. These melodies remain more in the normal range of the voice. This leaves some notes out. The soprano is missing either the D and A; or the C and D. The bass is missing the E or the B. This choral segment is only 6 measures and therefore it would have been difficult to get all the notes in to the music.

The same could be said for the next segment. It is only four measures (Figure 58-59).

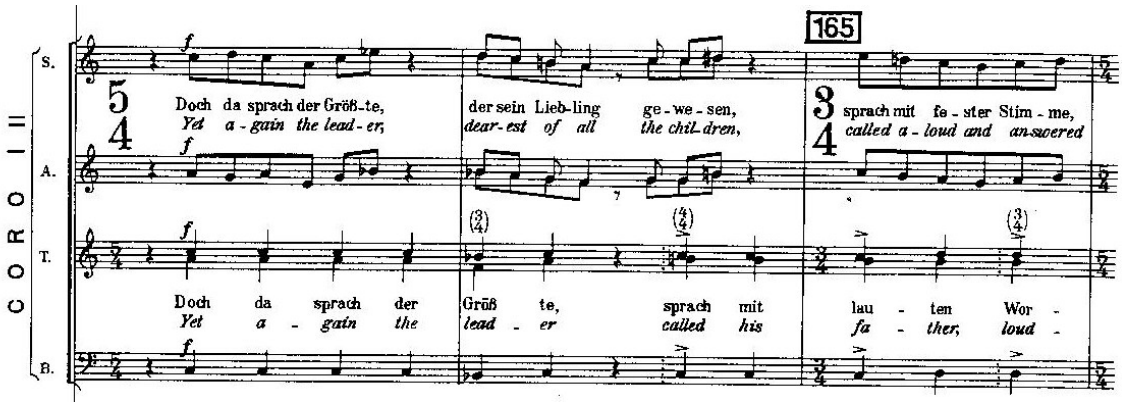


Figure 58: *Cantata Profana mm163-165*

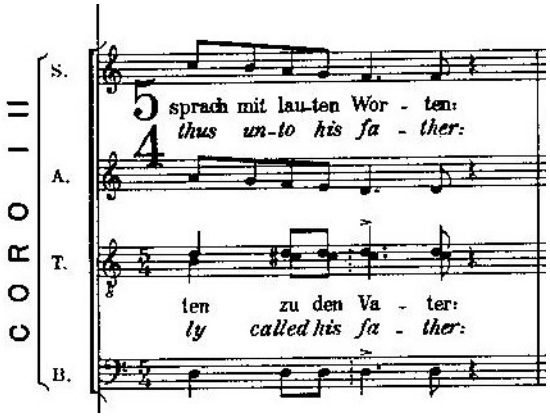


Figure 59: *Cantata Profana m166*

Sop. C - ^ - D - Eb - ^ - F - ^ - G - ^ - A - ^ - B

Alto C - ^ - D - ^ - E - F - ^ - G - ^ - A - Bb - B

Tenor C - ^ - D - ^ - E - F - ^ - G - ^ - A - Bb - B

Bass C - ^ - D ---------- B

Here is a conundrum. Notice that if the Eb from the soprano was added to the alto and tenor parts they would create the full "new melody" of the "new chromaticism" of the "new Hungarian art music". On the other hand, the folk mode that Bartók is using for the soprano is not one of the church modes but instead one of the folk modes that has two half steps only one half step apart. Just as occured in the expansion of the number of half steps in the chromaticism derived from folk modes, here the number of whole steps becomes expanded to 4. This is another way of introducing folk elements. The church modes were according to the white piano keys, in turn derived from the harmonic system discovered by the Greeks.

We therefore see that Bartók is expanding his tools of composition in both directions. He is expanding and contracting the chromaticism of the scale at the same time. Does this sound like one of the theories of Antokoletz? These common techniques

are basic to the composer. Consistently we find that movement is in both directions at once. In just the same manner as the fugue that moves in mirror image fashion, more and less chromaticism occurs at the same time.

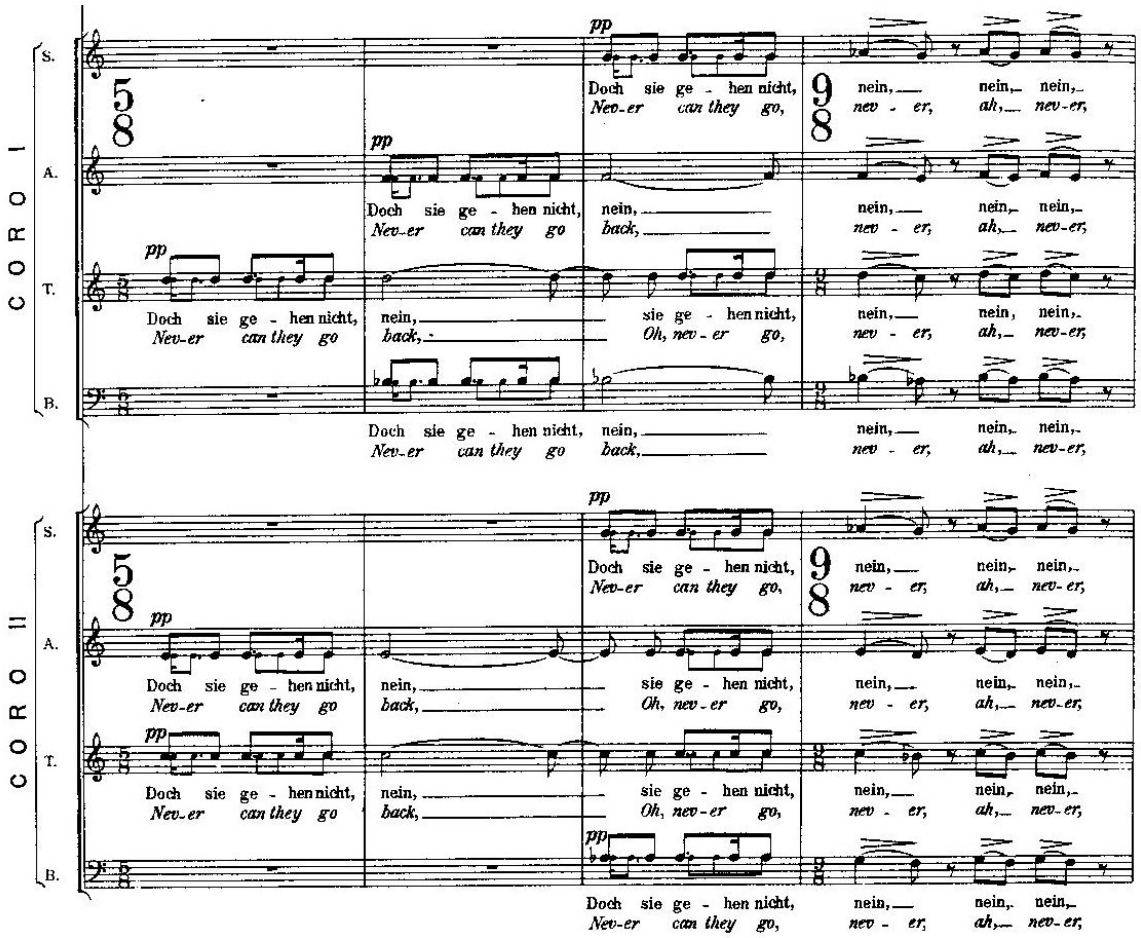


Figure 60: *Cantata Profana* mm188-191

The final choral segment of the movement (Figure 60 and 61) leads into the next movement. This is a new mode that resembles the pitch material from the soprano in the last segment. Where the pitch collection of the soprano was C - ^ - D - Eb - ^ - F - ^ - G - ^ - A - ^ - B, now the pitch collection has become D – E - F - G - Ab - Bb – C - D.

This closely resembles the Rumanian mode from the Banat district. Bartók said that it was used in aeolian mode with the following segment. F – G – Ab – Bb – C – [D].[57] Aeolian with that segment would result in the scale D – E – F – G – Ab – Bb – C – D. The two choruses have agreed on one group of pitches at last, to end the movement.

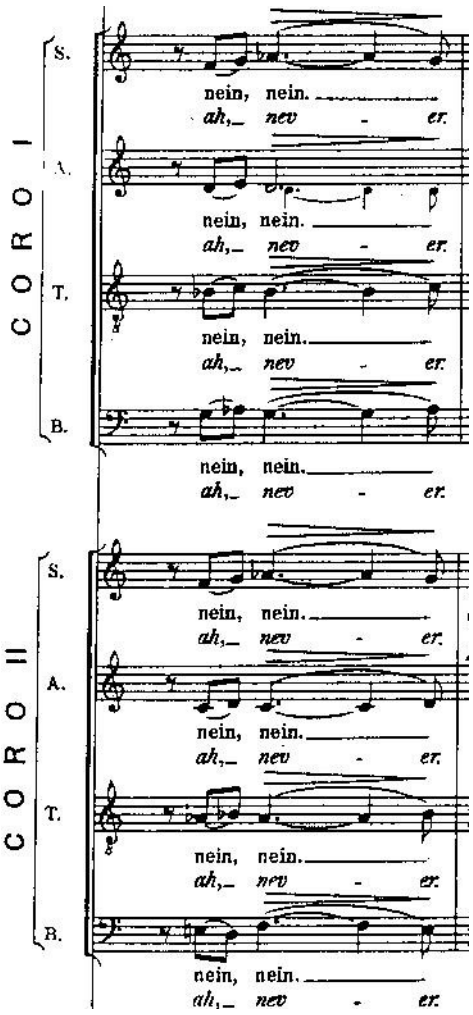


Figure 61: *Cantata Profana m192*

[57] Belá Bartók, *Rumanian Folk Music* vol II, ed. By Benjamin Suchoff. (The Hague, Netherlands: Martinus Nijhoff, 1967), 17.

Through the movement, the overall progression has been from dense chromatic texture back to a more modal texture. The voices that were using different collections have at this point come to an agreement. The bass moves to the D as the last sound from the choruses ends.

We can see by this that we have moved down a half step during the movement. It started on Db and has now come to rest on D leading into the next movement on the long held note of the tenor solo.

The last two choral segments are the only ones in the movement that do not contain the Db or C#. This shows the overall movement from the Db pitch level to the D pitch level. There is also the movement from the chromatic to the diatonic. The movement began with intense chromaticism in half stepwise contrary motion. It ends with all voices sharing the same diatonic pitch classes. Antokoletz has always held forth on the basic technique of Bartók being the contraction and expansion. The movement starts in amazingly dense texture and chromaticism and moves back toward a clearer, more diatonic technique. These large slow movements create a feeling of sidereal motion, that has an organic sense of being one with nature and its sacred proportions.

# Conclusion

It was the purpose of this study to show the relation of the Golden Section to the formal proportions in selected works of Bartók. The main part of the study centered around the *Eight Hungarian Folk Songs, Fourteen Bagatelles, Bluebeard's Castle, Twenty Hungarian Folk Songs, Fourth String Quartet, Cantata Profane* and *Music for String Instruments Percussion and Celesta.* A time line was observed to attempt to show a progression of how the composer used Golden Section proportions and the Fibonacci Series in his works. The works stretch from 1907-1936 and are representative of the composer's output during his most prolific period.

In the next chapter, the Golden Section and Fibonacci Series are shown to be used in relation to the contrapuntal procedures. The *Fourth String Quartet* and *Music for String Instruments, Percussion and Celesta* are the main examples of how the composer uses stretto and fugal figures to define his formal proportions. Contrapuntal procedures become important structural elements.

Next, the relationship of Golden Section to the new melodic style of Bartók is explored. Some of the earlier attempts to find a relation between the Fibonacci Series and harmony and melody are discussed. Symmetrical constructions, including x-cells and z-cells are discussed in relation to the "new chromaticism" that the composer discusses in his Harvard Lectures. Various works are examined with relation to these "new melodies" and how they are used in combination with other procedures, e.g. pentatonic modes.

The last two chapters are a discussion of more ways that the composer has used the Golden Section and Fibonacci Series. These are discussed in relation to numerical significance of the drama. Then the link between the melodies of the opera and *Cantata*

*Profane* is explored. Bartók used these "new melodies" with extended folk melodies and combined modes to create a rich melodic texture.

Scholars have long understood that there are things in Bartók that are hidden and more complex than almost any other composer. His use of Golden Section and Fibonacci Series shows his craft and workmanship. He went much further than was necessary to make his works pleasing on many different levels, from rhythmic devices as we discovered in the Folk songs, the *Fourth String Quartet* and *Bluebeard's Castle,* to melodies and harmonic texture as we discovered in the Folk Songs. Bartók went far beyond the use of these proportions in his compositions. We can only begin to hope to understand all the ways he used these proportions. It can be hoped that this paper will advance this knowledge in some way. It has been a great voyage of discovery for the author. Listening to the *Fourth String Quartet* and *Bluebeard's Castle* made it apparent that there was something going on that was more than we understood. Gradually it became apparent that there was a type of melody that was not scales or modes that were previously known. It was not pure chromaticism, either. Instead, the early works show that the composer had found new ways to organize chromaticism. He told us that it was at first "polymodality" that came from combining two modes a half step apart. At first this was used in the manner of a folk song, with only a few pitches, less than half an octave. This immediately anticipates the composer's later devices. The x-cell formed from 4 half steps is produced. This original new device was an early development of the atonal movement. Naturally, when the 12 notes of the scale begin to be used freely, it is possible to have constructs like the x-cell that were not possible in the diatonic system. The Y-cell springs from the whole tone scale. The whole tone is another way that was being used to replace the old tonality. These other devices were not based on folk songs. The pentatonic system and the chromaticism over small range both were found in folk

songs. These helped to show the composer the way to expand those folk song methods to construct larger scales that contained eight or more half steps. In doing this one exceeds the range of the folk song chromaticism. Then you have arrived at an entirely new system. A combination of whole tone, pentatonic and other earlier scales are therefore included in this new method. In addition, the composer pointed out that a scale could then be constructed where the notes maintained a relation to a fundamental. Previously the use of chromaticism was wrongly thought to be independent of a fundamental. The composer says that this is not really possible with harmonics creating relations between the notes that can be heard and therefore cannot be ignored. By combining two modes, the resulting scale was still seen to relate to a fundamental. This is the principle difference between Bartók's method and other chromatic or "atonal" composers. His knowledge of other composer's serial compositions had shown him that there was actually a relation of the tones that was still there, although the old key relations were gone.

This lead to a new procedure that was based on polytonality: the "new chromaticism". Bartók's attempt to develop a new type of chromaticism was an outgrowth of his study of folk songs. When the procedure stacking half steps was continued over a larger range than in folk songs, the result was a new scale. This scale had many new capabilities. It could be used as a complete scale. Unlike the chromaticism of folk songs, that only could be used for melodies this new "melodic-diatonic" construct had in it the germ of such things as z-cells. The possibilities were soon being put to good use. The two half steps a tritone apart could now be formed from the same pitch collection. Their relation to interlocked chords cannot be denied, but this was the first place they could be written diatonically.

The purpose of this paper was to attempt to show that Bartók was using many different ways to shape his works with the Golden Section. Far more than overall proportions were used. The care and attention to detail in even the smallest works helps to give credence to the composer's possible use of the Fibonacci Series in creation of new melodic concepts. Whether this was just further evidence of the composer's love for symmetry, or a new method is difficult to assess. It is to be hoped that this paper will help to nudge forward the boundaries of our musical knowledge.

# Appendix – Melody pitch collections from *Bluebeard's Castle*

| (Judith) mm. | Pitch Collection | (Bluebeard) mm. | Pitch Collection |
|---|---|---|---|
| 1-37 | C# D^E ^F# G G#A^B<br>10 scale step or degree | 27-31 | C# D E F# G A B |
| 38-39 | Db D Eb F Gb A | 43-45 | C G G# A B |
| | | 45-46 | C D Eb |
| | | 46 | Db E F Gb |
| 50-51 | D Eb F B | 47-49 | C# D E F# G# A B<br>Symmetrical around F# |
| 66-82 | C^ D^E^F# G G# A^ B<br>11th degree form | 57 | F# A |
| | | 64 | G Bb |
| 103-148 | ^C# ^D# E^F# ^G# ^A# B<br>3rd degree form | 91-120 | C# D# E F# B |
| | | 136-142 | C C# D E G A B |
| | | 143(TRANS) | Bb |
| 151-161 | D^E^F# G^A^B<br>(CAN INVERT) | | |
| 162-171 | C# D# E G Bb B | | |
| 172-193 | C Db D Eb^F ^G Ab^Bb^<br>Prime | 176-177 | E G A |
| 194-201 | C E F G A B<br>White Key Form | | |

| | | | |
|---|---|---|---|
| 202-204 | C# D# E | | |
| 205-211 | C^D^E^F Bb | | |
| 212-218 | C^^E^F#GG#^^B | | |
| 219-224 | C D E F G A WHITE | 226-227 | E F B |
| 245-249 | C D E F# G# A | | |
| 254-258 | E G A B | | |
| 259-260 | C Db G Gb | 261-262 | C D E A |
| 264-268 | D Eb A Bb | | |
| 268-273 | C C#D^E^^^G#A^B<br>10 DEGREE FORM | 274-275 | C# E G# |
| 277-280 | C C# D#E A(2) | | |
| 281-290 | C E D# E F# G# | | |
| 291-306 | C C#^D#E F#^A^B<br>3 degree form | 305 | F# G# |
| 312-313 | C D Eb F | | |
| 314-315 | C D# E F# G# | | |
| 317-319 | Gb Ab Bb B | | |
| 320-322 | F G A B | | |
| 323-325 | D E F# G G# A B | | |
| 327-328 | C Db D Eb^F^G Ab^Bb^<br>Prime Form | 333-335 | C Eb F Ab Bb |
| 337 | C F G Bb | | |

| | | | |
|---|---|---|---|
| 338 | E F# G# Bb | | |
| 351-353 | C E G B | 351-353 | C E G B |
| 354-357 | C Db Eb E | | |
| 359-361 | C E Gb Ab Bb<br>Pentatonic | 362 | C F# |
| 368-376 | Eb E F G Ab | 378 | D# F# |
| 379-386 | C#^D#E F F#^G#^A# B<br>4rd degree FORM | 386-387 | E# G# |
| 389-392 | C D E F G# B | | |
| 400-403 | C G# A B | | |
| 404-405 | C# E F A | 406 | C# D# E# F# A |
| 409-412 | C E F# A | | |
| 411-417 | C C# D E | 418 | D F A B |
| 419 | E B | 427-430 | C # D# G# B |
| 437 | D# E F B | 432-435 | C# D# F# G# A# |
| 438-440 | C C# D G A | 442 | C# F# B |
| 445-449 | C# D# F# A A# | 445-449 | C# D# F# A |
| 453-455 | C D D# G A B | | |
| 456 | F# G# | 458-465 | F# G# |
| 461-464 | D E F F# G# B | 472 | E# G# |
| 470 | C# D F A# B | | |
| 476-481 | C# D# E F# A A# | | |

| | | | |
|---|---|---|---|
| 486 | C D Eb F A B | | |
| 492 | C# D# F# G A B | | |
| 498-507 | C# D# G# A# | 495-496 | C D F G Bb |
| 508-513 | C# D# E F# A# | 516-522 | C# D E F# G# A |
| | | 523-527 | C^D^E F^ G Ab A Bb^<br>8 DEGREE FORM |
| 530-531 | C# D# E F# A A# | 537-539 | C# D# G# B |
| 532-533 | D# E F F# (X-CELL) | 541-544 | C E F Ab |
| 545 | C D E G Ab Bb | 550-551 | E F# B |
| | | 554 | C# E F# G# A |
| 560 | C D | | |
| 563-565 | C D E A | | |
| 569-588 | C C# D# E F# G A B | 583-585 | C D E G A |
| 602-603 | Db Gb Bb | | |
| 617 | D F Bb | 622-632 | C D E G Bb |
| 664-671 | C^D Eb^F^ G^ A Bb B | 677-681 | Db D Eb Ab A Bb |
| 681-686 | C E F Bb | | |
| 689-690 | C# D E F | | |
| 691-693 | C E F A Bb B | | |
| 695-698 | ^Db^Eb^F Gb^ Ab A^ B<br>INVERTED 6th DEGREE | 698-699 | C D Eb Ab Bb B |
| 718-722 | C# D#E G# B | 723-724 | C C# D E G# |

| | | | |
|---|---|---|---|
| 727 | C D E F A | 726-729 | C# E# G# |
| | | 732-739 | C D E F# G G# Bb |
| | | 745 | D# G B |
| | | 769-775 | C D E G A |
| 778 | Eb Gb Ab Bb | 784-791 | D E F G A B |
| 794 | Db Eb Ab Bb | 799-804 | D E A B |
| 807 | C D Eb F G A | 813-832 | C D Eb E G Bb |
| 811 | C# E F# G# | | |
| 838-840 | Eb Gb A | 841-848 | C^ D^ E F^ G Ab A Bb^<br>7 DEGREE FORM |
| 851 | D E A Bb | 854-862 | C D F# G |
| 867-870 | C# A Bb | 874-885 | D Eb E F A |
| 888-892 | Eb E Bb B | 894-897 | D Eb F Gb A Bb B |
| 898-907 | C^D Eb^ F^ G# A A# B | | |
| 908-912 | E F G# | | |
| 913 | D# F# A B | 913-916 | C D Ab Bb |
| 917 | Eb G A B | 951-952 | Db F A Bb |
| 966-979 | C E G A | 980-983 | E G |
| 993-1008 | C E G A | 995-999 | E G |
| | | 1009-1011 | E G A |
| | | 1020-1022 | C^D Eb E F^Ab A^^ |
| | | 1025-1033 | C^ D Eb E F^Ab A^^ |

| | | | |
|---|---|---|---|
| 1159 | C# D E F G A B | 1173-1188 | C C# E G A B |
| 1210-1211 | Eb E A | 1207-1209 | C Eb G |
| | | 1216-1217 | D G |
| | | 1219 | D F G A B |
| | | 1228-1230 | Eb F G Bb |
| | | 1233-1235 | C D G A B |
| | | 1237-1239 | C C# D# E A B |
| | | 1240-1243 | C D F G B |
| | | 1249-1262 | C D E F G A Bb |
| | | 1265-1277 | C D E F# G A B |
| 1279-1280 | A B | 1278-1281 | C C# D Eb F# B |
| 1295-1304 | C B | 1283-1296 | C D F G A B |
| 1306 | D# E F F# | 1301-1306 | D E F# A |
| | | 1312-1318 | C D G Bb B |
| 1323-1330 | C# D Eb E | 1323 | Db Eb G Ab A B |
| 1331 | C B | 1367-1383 | C C# D F F# G A |

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## Vita

Larry Oubre is a native Texan, born just outside of Corpus Christi, in Robstown, Texas, May 25, 1955. He graduated from Harlingen High School in 1974, having participated in Region Bands and All-State Choir. He had sung programs with the San Antonio Symphony and the San Antonio Symphony Opera Program. In college, he appeared as soloist with the Pan American University Choir with orchestra and Opera and the Sam Houston State Choir with orchestra. At the University of Texas at Austin, he appeared in opera scenes with Walter Ducloux and several local opera groups. He appeared with Jerome Hines in the opera "I am the Way" written by Mr. Hines and starring Mr. Hines in the role of Jesus. Later he studied with William Murray, leading baritone at the Deutsche Oper in Berlin, W. Germany. Mr. Oubre appeared in Bach Cantatas and numerous choral and musical theater scenes and revues in Berlin. He has appeared with the UT opera and Austin Lyric Opera (17 productions). He has also appeared in and directed operas at Texas State in San Marcos, as well as Austin theaters. His students have won local competitions and appeared in New York City. Semi-finalists and finalists at the National Association of Teachers of Singing local and regional auditions have come from his studio. Many have received scholarships in Voice and Musical Theater. He has been a full member of NATS for over ten years. He is also a member of Phi Mu Alpha Sinfonia and the College Music Society, and has received several scholarships.

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